Pacific Gas and Electric Company®

Sidney Bob Dietz II
Director
Regulatory Relations

Pacific Gas and Electric Company
300 Lakeside Drive
Oakland, CA 94612

April 5, 2023

Advice 6902-E
(Pacific Gas and Electric Company - U 39-E)

Advice 5003-E
(Southern California Edison Company - U 338-E)

Advice 4194-E
(San Diego Gas & Electric Company ID U 902 E)

Public Utilities Commission of the State of California

Subject: Notice of Availability of a Model of Essential Usage of Electricity for Residential Customers of Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company

Purpose

This Tier 2 Advice Letter provides notice of the availability of a model of essential use of electricity for residential customers of Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E) (together, the large electrical corporations). The development of this model was the subject of Ordering Paragraph (OP) 14 of Decision (D.) 18-08-013, issued on August 17, 2018, which directed PG&E to develop a study plan (including budget) for developing a model of what constitutes essential use for its residential customers, and D.20-09-021, issued on September 24, 2020, which approved an Essential Usage Study plan and budget, pursuant to PG&E's Compliance Filing of Joint Investor-Owned Electric Utilities' Final Essential Usage Study Proposal[1] that was filed on April 10, 2020 and approved by the Commission via D. 20-09-021.

Background

In Ordering Paragraph (OP) 14 of D. 18-08-013, issued August 17, 2018, the Commission directed PG&E to propose a study plan and budget for development of a model of what constitutes essential electricity use for its residential customers. Subsequently the Commission issued a similar requirement for SCE (in D.18-11-027) and SDG&E (in an Administrative Law Judge Ruling, issued on November 1, 2019, in A.19-03-002).

PG&E filed its GRC Phase II Application (A.19-11-019) on November 22, 2019. As part of its application, PG&E submitted an essential usage study (EUS) plan on behalf of itself and the other large electrical corporations. The Assigned Commissioner's Scoping Memo

[1] See Table 2 at page 30, which references submittal of the Final Report via Tier 2 Advice Letter.

and Ruling (scoping memo) was issued on February 10, 2020. The scoping memo created a bifurcated track of the proceeding for expedited consideration of the EUS plan and ordered SCE and SDG&E to file for party status and participate in that portion of the instant proceeding. The scoping memo also ordered PG&E to serve and file the final EUS plan on behalf of the large electrical corporations on April 1, 2020. On March 30, 2020, the assigned Administrative Law Judge (ALJ) issued a ruling that granted the request of the large electrical corporations to extend the deadline for the final EUS plan to April 10, 2020.

On April 10, 2020, PG&E filed a final EUS plan on behalf of the large electrical corporations. The plan incorporated comments made by other parties at a workshop held in March 2020. Three parties filed opening comments on the final EUS plan on May 11, 2020: PG&E, the Public Advocates Office at the California Public Utilities Commission (Cal Advocates), and the Center for Accessible Technology (CforAT). SDG&E filed reply comments on May 26, 2020, on behalf of the large electrical corporations. In Decision (D.) 20-09-021, issued September 24, 2020, the Commission approved the EUS study plan and ratepayer funding for the EUS in an amount not to exceed $845,054.

D.20-09-021 further ordered SCE to contract the work to Det Norske Veritas Germanisher Lloyd Group (DNV GL) to execute the EUS and associated web tool development and for the large electrical corporations to each establish a one-way Essential Usage Study Expenditure Balancing Account (EUSEBA).

In accordance with D.20-09-021, PG&E, SCE, and SDG&E submitted Advice Letters 5981-E, 4321-E, and 3637-E, respectively, to establish each of their EUSEBAs. Upon conclusion of the EUS and submission of the final EUS report, (1) PG&E will return any unspent funding to customers by transferring the balance in the EUS Sub-account to the Distribution Revenue Adjustment Mechanism (DRAM) for true-up in rates as part of its Annual Electric True-up (AET) process, (2) SCE will transfer the recorded balance in its EUSBA (not to exceed SCE's authorized amount) to the distribution subaccount of the Base Revenue Requirement Balancing Account to be recovered in rates as part of SCE's annual year-end consolidated revenue requirement and rate change advice letter, and (3) SDG&E will address the balance in its Annual Electric Regulatory Account Balance Update filing or other applicable proceeding deemed appropriate by the Commission.

Stakeholder Collaboration in Developing the Web Tool

Ordering Paragraph (OP) 2 of D.20-09-021 further directed the large electrical corporations to meet and confer with interested parties to develop a precise scope of work for an enhanced web tool within the budget approved. The large electrical corporations held five facilitated workshops with stakeholders, and 11 additional meetings with stakeholders, throughout the web tool development process. The stakeholder engagement process is documented in a memo entitled Essential Electric Usage Study

Final Stakeholder Engagement Report, incorporated into this submission as Attachment A.

Specific Requirements for the Model of Essential Use

OP 14 of D. 18-08-013 established specific requirements for the model of essential use.[2] The EUS web tool, now accessible to the public online via the URL https://caessentialuse.dnv.com/, meets these requirements as documented in the tables provided in Chapter Five of the Essential Use of Electricity Study Final Report that is incorporated into this filing as Attachment B.

This submittal would not increase any current rate or charge, cause the withdrawal of service, or conflict with any rate schedule or rule.

Protests

Anyone wishing to protest this submittal may do so by letter sent electronically via E-mail, no later than April 25, 2023, which is 20 days after the date of this submittal. Protests must be submitted to:

CPUC Energy Division
ED Tariff Unit
E-mail: EDTariffUnit@cpuc.ca.gov

The protest shall also be electronically sent to PG&E, SCE and SDG&E via E-mail at the address shown below on the same date it is electronically delivered to the Commission:

Sidney Bob Dietz II
Director, Regulatory Relations
c/o Megan Lawson
E-mail: PGETariffs@pge.com

In addition, protests and all other correspondence regarding this advice letter should also be sent by letter and transmitted via facsimile or electronically to the attention of:

[2] OP14 directed that the model "must be developed using research, both existing (information sources such as the Residential Appliance Saturation Survey and Experian data) and new direct customer surveys, to collect information on household size (in terms of both square footage and number of residents), building features (age, construction materials, insulation, etc.), and appliances (efficiency and usage) in order to better evaluate the essential electricity needs of PG&E's residential customers. This model of essential usage must be able to specify the amount of essential usage in both summer and winter for residential customers separately in each of the hot climate zone (baseline territories R, S, W, and P), the warm climate zone (baseline territories X and Y), and the cool climate zone (baseline territories T, V, and Z)."

For SCE:

Connor Flanagan
Managing Director, State Regulatory Operations
Southern California Edison Company
E-mail: AdviceTariffManager@sce.com

Tara S. Kaushik
Managing Director, Regulatory Relations
c/o Karyn Gansecki
Southern California Edison Company
E-mail: Karyn.Gansecki@sce.com

For PG&E:

Sidney Bob Dietz II
Director, Regulatory Relations
c/o Megan Lawson
E-mail: PGETariffs@pge.com

For SDG&E:

Greg Anderson
Regulatory Tariff Manager
E-mail: GAnderson@sdge.com
Email: SDGETariffs@sdge.com

Any person (including individuals, groups, or organizations) may protest or respond to an advice letter (General Order 96-B, Section 7.4). The protest shall contain the following information: specification of the advice letter protested; grounds for the protest; supporting factual information or legal argument; name and e-mail address of the protestant; and statement that the protest was sent to the utility no later than the day on which the protest was submitted to the reviewing Industry Division (General Order 96-B, Section 3.11).

Effective Date

Pursuant to General Order (GO) 96-B, Rule 5.2, and the Illustrative Schedule for Consideration of Bifurcated Joint Essential Use Study as presented in Table 9A-1 in Attachment A to Chapter 9, Proposed Interim Joint Investor-Owned Utilities Study Plan and Process for Identifying Electric Essential Usage for Residential Customers, PG&E 2020 General Rate Case Phase II Prepared Testimony, Revenue Allocation and Rate Design (Application 19-11 U-39), dated November 22, 2019, this advice letter is submitted with a Tier 2 designation. PG&E requests that this Tier 2 advice submittal become effective on regular notice, **May 5, 2023**, which is 30 calendar days after the date of submittal.

Notice

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically to parties shown on the attached list and the parties on the service list for R.18-07-006, A.16-06-013, A.19-03-002 . Address changes to the General Order 96-B service list should be directed to PG&E at email address PGETariffs@pge.com. For changes to any other service list, please contact the Commission's Process Office at (415) 703-2021 or at Process_Office@cpuc.ca.gov. Send all electronic approvals to PGETariffs@pge.com. Advice letter submittals can also be accessed electronically at: http://www.pge.com/tariffs/.

FOR PG&E:

/S/
Sidney Bob Dietz II
Director, Regulatory Relations

FOR SCE:

/S/
Connor Flanagan
Managing Director, State Regulatory Operations

FOR SDG&E:

/S/
Greg Anderson
Regulatory Tariff Manager

Attachments:

Attachment A: Essential Electric Usage Study Final Stakeholder Engagement Report

Attachment B: Essential Use of Electricity Final Report

cc: R.18-07-006 – Affordability OIR
A.16-06-013 – GRC 2017 Ph II
A.19-03-002 – GRC 2019 SDG&E Ph II

California Public Utilities Commission

ADVICE LETTER SUMMARY

ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Pacific Gas and Electric Company (U 39 E)

Utility type:
☑ ELC ☐ GAS ☐ WATER
☐ PLC ☐ HEAT

Contact Person: Stuart Rubio
Phone #: (951)965-8905
E-mail: PGETariffs@pge.com
E-mail Disposition Notice to: stuart.rubio@pge.com

EXPLANATION OF UTILITY TYPE
ELC = Electric GAS = Gas WATER = Water
PLC = Pipeline HEAT = Heat

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #: 6902-E

Tier Designation: 2

Subject of AL: Notice of Availability of a Model of Essential Usage of Electricity for Residential Customers of Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company

Keywords (choose from CPUC listing): Compliance

AL Type: ☐ Monthly ☐ Quarterly ☐ Annual ☑ One-Time ☐ Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: D.18-08-013

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL: No

Summarize differences between the AL and the prior withdrawn or rejected AL: N/A

Confidential treatment requested? ☐ Yes ☑ No

If yes, specification of confidential information:
Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information:

Resolution required? ☐ Yes ☑ No

Requested effective date: 5/5/23

No. of tariff sheets: 0

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: N/A

Service affected and changes proposed[1]: N/A

Pending advice letters that revise the same tariff sheets: N/A

[1]Discuss in AL if more space is needed.

Clear Form

Protests and correspondence regarding this AL are to be sent via email and are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:

California Public Utilities Commission
Energy Division Tariff Unit Email:
EDTariffUnit@cpuc.ca.gov

Contact Name: Sidney Bob Dietz II, c/o Megan Lawson
Title: Director, Regulatory Relations
Utility/Entity Name: Pacific Gas and Electric Company

Telephone (xxx) xxx-xxxx: (415)973-2093
Facsimile (xxx) xxx-xxxx:
Email: PGETariffs@pge.com

Contact Name:
Title:
Utility/Entity Name:

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

CPUC
Energy Division Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Clear Form

Attachment A

Essential Electric Usage Study Final Stakeholder Engagement Report

ESSENTIAL ELECTRIC USAGE STUDY FINAL STAKEHOLDER ENGAGEMENT REPORT

Written by *Common Spark Consulting* for *PG&E*
December 30, 2022

Authors:
Michelle Vigen Ralston, *Principal & Founder, Common Spark Consulting*
Suhaila Sikand, *Junior Consultant, Common Spark Consulting*
Katie Wu, *Senior Consultant, Common Spark Consulting*

Table of Contents

Background

The Essential Usage of Electricity

The term "essential use" as applied to residential electricity does not appear in the current Baseline statute (PU Code Section 739(a)-(d). Rather, the Baseline statute sets the parameters for adoption of baseline quantities as having to fall within a defined percentage range of usage and allows the California Public Utilities Commission (CPUC) to select whatever level of within that percentage range it finds to be "necessary to supply a significant portion of the reasonable energy needs of the average residential customer." The Essential Use of Electricity Study ordered[1] by the CPUC allows stakeholders to take a fresh look, using recent usage data relevant to what might be considered to be "essential usage," should an amendment to the current Baseline statute be desired.

The decision (D.18-08-013 - 8/17/2018) to develop a study plan for developing a model of what constitutes essential use also directed Pacific Gas and Electric Company (PG&E) to consult with interested parties when developing this plan. At the onset of the study planning process, PG&E, Southern California Edison Company (SCE), and San Diego Gas & Electric (SDG&E), collectively referred to as the 'Joint Utilities', held two public workshops with interested parties in summer 2019 to inform a joint Essential Usage Study (EUS) plan, which was completed in November 2019.

Following the public workshops to gather input and stakeholder comments on the EUS Plan, the Joint Utilities filed a Final EUS Plan on April 10, 2020, which proposes to use data from the 2019 Residential Appliance Saturation Survey (RASS)[2] as the foundation for its work and conduct two additional task options: conducting qualitative interviews on potential electricity underutilization and enhancing a web tool to display the data from the study.

The Final EUS plan was approved through D.20-09-021 (9/24/2020). The Final EUS Plan included additional optional tasks to be conducted by the Joint Utilities, including a follow-up survey for 2019 RASS Respondents, qualitative interviews on potential underutilization of electricity, and an enhanced Web Tool. Tasks include:

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[1] Ordering Paragraph (OP) 14 of CPUC Decision (D.) 18-08-013, issued August 17, 2018, directed Pacific Gas and Electric Company (PG&E) "to develop a study plan (including budget) for developing a model of what constitutes essential use for its residential customers." The Commission issued a nearly identical requirement for Southern California Edison (SCE) in OP 14 of D.18-11-027, issued November 29, 2018. An Administrative Law Judge Ruling issued on November 1, 2019 directed San Diego Gas & Electric Company (SDG&E) "to participate in PG&E and SCE's stakeholder process for developing a model of what constitutes essential use for its residential customers, and to develop such a model consistent with the specific directions provided to PG&E in D.18 08 013."

[2] The RASS survey is a large-scale statewide study conducted periodically to estimate the saturation of typical residential appliances and energy consumption tied to a wide range of end energy uses.

- **Task 1: Project Management and Stakeholder Coordination:** approve a study Work Plan and meet regularly
- **Task 2: Qualitative Interviews:** conduct a minimum of 75 interviews to 2019 RASS survey respondents across varying demographics
- **Task 3: Additional Data Collection:** follow-up with 2019 RASS respondents, including those on or near medical baseline eligibility, to complete a separate questionnaire with an additional 10 questions, referred to as the EUS Survey.
- **Task 4: Modeling and Quantitative Analysis:** model usage for various end uses using consistent methodologies
- **Task 5: Base Web Tool (Dashboard):** create an enhanced Web Tool to allow users to interact with datasets and estimate usage for various scenarios
- **Task 6: Added Functionality for the Web Tool:** beef up the Web Tool for additional data, confidence intervals, and filtering
- **Task 7: Final Report and Presentation:** write a report to summarize methodologies of the study and key findings

The EUS decision (D.20-09-021) directed the Joint Utilities to "meet and confer" with stakeholders to develop a precise scope of work for an enhanced Web Tool within the budget approved. The timeline below outlines all of the engagement opportunities (facilitated and non-facilitated) held for stakeholders on the EUS project broadly. At times, to support more on-going stakeholder feedback, the Project Team invited stakeholders to non-facilitated feedback sessions and meetings (indicated below in gray).

- On March 18, 2020, the Joint Utilities held a workshop to gather stakeholder input on the EUS Plan prior to the Joint Utilities' submission of the plan in early April. **(Task 1)**
- On November 13, 2020, the Joint Utilities held the first in a series of Meet and Confer stakeholder workshops to develop a scope for the Web Tool. Based on prior discussions and party comments, the facilitation team worked with participants to prioritize elements and features that should be included in the Web Tool. **(Tasks 5 & 6)**
- On July 20, 2021, the Joint Utilities held a Meet and Confer workshop to discuss the preliminary concepts for the Qualitative Interview Guide on potential underutilization of electricity and share an updated Web Tool based on the prioritization of features from the November 2020 workshop. **(Tasks 2, 5, & 6)**
- On July 30, 2021, the Joint Utilities held a brief meeting inviting stakeholders to provide feedback on draft interview questions for the Qualitative Interview Guide on the potential underutilization of electricity. **(Task 2)**
- On August 6, 2021, the Joint Utilities held a facilitated stakeholder session to present the Modeling and Analysis Plan (fundamental to the Web Tool), review revised draft interview questions and present an overview of the Web Tool functionality. **(Tasks 4, 5, & 6)**

- On September 10, 2021, the Joint Utilities held a meeting with stakeholders to present the revisions made to the draft Qualitative Interview Guide in response to stakeholder feedback. **(Task 2)**
- On October 19, 2021 and December 6, 2022, the Joint Utilities held short sessions with stakeholders to discuss and review initial results from the qualitative interviews for 2019 RASS Respondents and present updates to the Web Tool development. **(Tasks 2, 5, & 6)**
- On February 4, 2022, the Joint Utilities held a stakeholder session to review the scope of the Web Tool as refined by the availability of data from the customer surveys to present several Web Tool user scenarios to demonstrate planned functionality. **(Tasks 3, 5, & 6)**
- On March 4, 2022, the Joint Utilities presented the findings from the Qualitative Interviews to stakeholders and distributed the draft report on these results to stakeholders for review. **(Tasks 2 & 7)**
- On April 1, 2022, the Joint Utilities held a stakeholder session to present an update on the development of wireframes for the Web Tool. **(Tasks 5 & 6)**
- On April 22, 2022, the Joint Utilities invited stakeholders to a session to discuss the draft Quantitative Survey Instrument with questions to distinguish generic usage from usage specific to medical needs. **(Task 3)**
- On June 10, 2022, and on July 8, 2022, the Joint Utilities held meetings for stakeholders to provide status updates on the Quantitative Surveys, the modeling and analysis of data for the Web Tool, and on Web Tool development. **(Tasks 3, 4, 5, & 6)**
- On August 12, 2022, the Joint Utilities held a stakeholder session to present the Web Tool user interface mock-ups. **(Tasks 5 & 6)**
- On September 9, 2022, the Joint Utilities invited stakeholders to attend a presentation of results from the Quantitative Survey and circulated the draft report of results to stakeholders for review. **(Tasks 3 & 7)**
- On October 7, 2022, the Joint Utilities held a demonstration of the Web Tool's features, interface, and output. **(Tasks 5 & 6)**
- On December 9, 2022, the Joint Utilities held a final stakeholder meeting to summarize the EUS plan process, present a spotlight on the Web Tool, and tee up the Final EUS Report released shortly thereafter. **(Tasks 1, 5, 6, & 7)**

Project Team

Name	Organization
Dan Bausch	APPRISE
David Carroll	APPRISE
Nelson Chiu	DNV

Paula Ham-Su	DNV
Tyler Mahone	DNV
Claire Palmgren	DNV
Jon Taffel	DNV
Chris McRoberts	PG&E
Brian Arthur Smith	PG&E
Gail Slocum	PG&E
Hank Elgin	SCE
Cyrus Sorooshian-Tafti	SCE
Reginald Avery Wilkins	SCE
Kyle Kettler	SDG&E
J Lopez	SDG&E
J.C. Martin	SDG&E
Leslie Willoughby	SDG&E

Interested Stakeholders

Name	Organization
Melissa Kasnitz	Center for Accessible Technology
Paul Goodman	Center for Accessible Technology
Cynthia Lee	CPUC - Public Advocates Office
Christopher Hogan	CPUC - Public Advocates Office
Alan Siebuhr	CPUC - Public Advocates Office
Xian Li	CPUC - Public Advocates Office
Lee-Whei Tan	CPUC - Public Advocates Office
Jieli Feng	CPUC - Public Advocates Office
Marshall Worsham	CPUC - Public Advocates Office

Eileen Hlavka	CPUC - Energy Division
Jason Symonds	CPUC - Energy Division
Peng Gong	CPUC - Energy Division
Ali Choukeir	CPUC - Energy Division
Ankit Jain	CPUC - Energy Division
Bridget Sieren-Smith	CPUC - Energy Division
Sarah Lerhaupt	CPUC - Energy Division
Cheri Chan	CPUC - Energy Division
Lynn Marshall	California Energy Commission
Nat Treadway	DEFG
Paula Ham-Su	DNV-GL
Miriam Goldberg	DNV-GL
Claire Palmgren	DNV-GL
Jonathan Taffel	DNV-GL
Amber Watkins	DNV-GL
Ben Johnson	DNV-GL
Craig Williamson	DNV-GL
Timothy Hennessy	DNV-GL
Brian Theaker	NRG Energy
Brian Arthur Smith	Pacific Gas and Electric Co.
Gail Slocum	Pacific Gas and Electric Co.
Darren Roach	Pacific Gas and Electric Co.
Chris Kato	Pacific Gas and Electric Co.
Doug Karpa	Peninsula Clean Energy
Alexia Retallack	Pioneer Community Energy
Brittany Malowney	San Diego Gas & Electric

J.C. Martin	San Diego Gas & Electric
Cynthia Fang	San Diego Gas & Electric
Aaron Lu	San Diego Gas & Electric
Alana Hammer	San Diego Gas & Electric
Sandra Williams	San Diego Gas & Electric
Cyndee Fang	San Diego Gas & Electric
Sharon Cohen	Sempra Energy
Hank Elgin	Southern California Edison
Cyrus Sorooshian-Tafti	Southern California Edison
Luis Gutierrez	Southern California Edison
Prapti Gautam	Southern California Edison
Reginald Wilkins	Southern California Edison
Wendy Ethier	Southern California Edison
Carol Edwards	Southern California Edison
William Briggs	Southern California Edison
Wayne Yu	Southern California Edison
Jennifer Dowdell	The Utility Reform Network
David Cheng	The Utility Reform Network
Gabriela Sandoval	The Utility Reform Network

Facilitation Team

The Joint Utilities, through a PG&E contract, hired Common Spark Consulting to facilitate selected Meet and Confer stakeholder meetings. The facilitation team was composed of four members of Common Spark Consulting: Michelle Vigen Ralston, Principal and Founder; Katie Wu, Senior Consultant; Meghan Harwood, Consultant; and Suhaila Sikand, Junior Consultant.

Facilitated Stakeholder Meetings

March 18, 2020: Public Workshop to Finalize Electric Essential Usage Study Design

On March 18, 2020, the Joint Utilities hosted a public workshop, as directed by the CPUC, to gather input and stakeholder comments on the draft Study Plan (Task 1) by April 1, 2020. The workshop provided background information on the purpose and process leading up to the workshop and offered opportunities to comment.

Stakeholders were asked to comment on the data collection process for the RASS and EUS. Conversations focused on five main topics:

1. Feasibility, likelihood, and scope of a follow up data collection process to better align with the needs of low-income and medical baseline customers, especially given the unknown effects of the COVID-19 pandemic.
2. Further analysis of medical baseline data, specifically to better understand customer needs and behaviors, devices used, and program enrollment rates.
3. Specific equipment types and what might or should be considered as "essential use," including electric vehicles.
4. Web Tool introduction - following a presentation, participants agreed that a workshop specific to the Web Tool should be held.
5. EUS Project deliverables including data, the Web Tool, and a related high-level report.

November 13, 2020: Meet & Confer to Prioritize Web Tool Variables and Features

On November 13, 2020, the Joint Utilities hosted a meeting to gather feedback on the Web Tool Variables and Features and discuss which of them the study should prioritize (Tasks 5 & 6). Utilities noted that prioritization is not always an indicator of the feasibility of including a certain feature or data variable in the Web Tool, as limits could arise due to budget availability, granularity of RASS data, and data sample size. The discussion was framed by two main questions:

1. What kinds of questions are important to essential usage?
2. What questions do you hope the Web Tool will answer?

Stakeholders, based on a survey leading up to the meeting, prioritized variables for the Web Tool, noting 'Must Have' and 'Like-to-Have' data variables (Table 1).

Table 1. Priority Web Tool Variables

Must Haves	Like-to-Haves
• IOU territory • Rooftop Solar • NEM (net energy metering) Rate • EV (electric vehicle) Rate • Medical Baseline • Income bracket and/or low income designation (e.g., Non-CARE/CARE/FERA)[3] • Margin of Error Estimate • Permanently Disabled Residents	• Title 24 Climate Zones • Service Type • Estimated Household Income • Fixed Adjustment Factor for each appliance • Vacation Home • Appliance Use Intensity • Window Panes • AC Type

During the meeting, stakeholders also discussed other high priority Web Tool variables:

- Zip code/county
- Detached/shared wall/apartment/mobile home
- Ethnicity of Head of Household
- Electric/hybrid vehicle
- Housing type
- Occupant number
- Appliance Age
- Appliance Type

Web Tool features discussed in the meeting included: (1) the ability for users to construct and analyze their own appliance packages and (2) an underutilization analysis.

July 20, 2021: Meet & Confer re: Draft Guide for Qualitative Interviews

On July 20, 2021, the Joint Utilities hosted a meeting to discuss the Qualitative Interview Guide (Task 2) and present an updated Web Tool plan (Tasks 5 & 6). Stakeholders elevated the following considerations:

- Identify seasonal versus year-round behavior changes;
- Distinguish conservation versus underutilization;
- The need to interview outliers and medical baseline;
- The process to identify interviewees.

[3] California Alternate Rates for Energy (CARE); Family Electric Rate Assistance Program (FERA). For more information, visit: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/care-fera-program

Stakeholders also requested an additional stakeholder process to review a set of draft interview questions. Joint Utilities hosted a follow-up meeting on July 30, 2021.

In addition, stakeholders recommended the following updates for the Web Tool:

- Disaggregate medical baseline from Miscellaneous category;
- Rename 'head of household' for inclusivity;
- Clarify baseline territory;
- Clarify limitations inherent with filtering energy use per appliance when possible;
- Elevate fuel type in prioritization;
- Add a layer of prioritization for actionability against billing systems;
- Include time of use; and
- Deprioritize household income.

August 6, 2021: Meet & Confer re: Modeling and Analysis Plan

On August 6, 2021, the Joint Utilities hosted a meeting to discuss how RASS data was collected and what models and analysis can be made for the Web Tool through the Weather Normalization and Conditional Demand Analysis methodologies (Task 4); the Qualitative Interview Guide (Task 2); and updated Web Tool functionality (Task 5 & 6). Stakeholders elevated a desire to disaggregate data by the kind of medical device, however this level of granularity was speculated to be infeasible to capture through the Web Tool.

Stakeholders raised clarifying questions on the updates to the Web Tool including anonymization, data sets, and how to incorporate medical baseline. The Project team provided clarification on the connection between qualitative interviews, the Web Tool, and Final Report. Stakeholders elevated the importance of framing interview questions to encourage open ended answers.

December 9, 2022 Final Stakeholder Meeting

On December 9, 2022, the Joint Utilities hosted a final stakeholder meeting to summarize the EUS stakeholder process, spotlight a beta version of the Web Tool (Tasks 5 & 6), and introduce the soon-to-be-released Final EUS Report (Task 7).

During the meeting, stakeholders elevated suggestions to provide context for climate zones within the search query page and clarified questions regarding next steps, expected timelines, and final contents of the Final Report, final dataset, and User Guide as well as how and by when to provide Web Tool feedback. Melissa Kasnitz of Center for Accessible Technology raised questions about the outcome of an Advice Letter to

anticipate whether or not stakeholder can apply for Intervenor Compensation (I-Comp).[4] Conversations with the Project Team and Kasnitz will continue offline to endorse eligibility for I-Comp as stakeholders have made significant contributions to this project.

Facilitator Notes

Common Spark was asked to provide stakeholder engagement advisory and facilitation for the EUS project process due to the complexity of both the technical topic and the stakeholder landscape. Common Spark approaches its facilitation work with a specific focus on inclusivity and ensuring maximum accessibility of stakeholders to the decision-making process and integration of input from stakeholders.

Below are a few notes, observations, and outcomes from the Facilitation Team:

- **Complexity of the project scope:** The EUS project scope is complex in terms of regulatory requirements and impacts, research and technical knowledge, software design and development, and stakeholder priorities and landscape. The potential uses of the Web Tool and outcomes of the EUS are myriad. This required the Project Team and stakeholders to get very specific about their priorities, limitations, capabilities, and needs.
- **Allowed stakeholder needs and vision to lead:** As facilitators, we observed the Project Team genuinely work to honor the fact that the EUS would be a critical tool to expand access to data to inform and support effective advocacy, enriching the stakeholder dialogues in all the venues the EUS might be used.
- **Prioritization of stakeholder access:** The facilitation team appreciated how the Project Team was able to and wanted to prioritize the schedules and availability of interested stakeholders when setting dates and times of facilitated meetings
- **Transparency:** The Project Team provided clear and detailed project updates, were transparent about changes to schedule, and delays were often to benefit project quality and incorporation of stakeholder input.
- **Cooperation and Accountability:** Project team and stakeholders alike followed through on action items and commitments. There was some required work between meetings for stakeholders, in order to support a more robust discussion during meetings. Stakeholders did the detailed work ahead of time, brought specific and thoughtful questions, and the Project Team prepared for each meeting to be able to address anticipated questions as they came up.

While a formal evaluation on the stakeholder process was not done for this project, this would be worth implementing in future stakeholder engagement processes. It can be done in light-touch approaches, such as post-meeting or in-meeting surveys, as well as a final survey or other form of input about stakeholder satisfaction on the process and any recommendations.

[4] Intervenor Compensation requires CPUC action or response to a filing.

In lieu of a more formal evaluation process and data, Common Spark observes that the stakeholder process for the EUS provided consistent opportunities for stakeholders to engage, meaningful opportunities for stakeholder input to influence the project, and ongoing and transparent communication about the project process. Generally, based on this process, we would like to see more Commission and policy development processes adopt many of the approaches in practice with the EUS Project Team and stakeholders.

Appendices

The following Appendices contain:

1. March 18, 2020 Meeting Summary
2. November 13, 2020 Meeting Summary
3. July 20, 2021 Meeting Summary
4. August 6, 2021 Meeting Summary
5. December 9, 2022 Meeting Summary

Public Workshop to Finalize Electric Essential Usage Study Design

Meeting Notes | Submitted March 25, 2020

Wednesday, March 18, 2020 from 9:45am-2:00pm
Online Workshop
Hosted by: Pacific Gas and Electric Company
Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

This document contains four sections:

1. Attendees
2. Facilitator Takeaways
3. Notes
4. Appendix: Public Advocates additional comments and questions

Attendees

Those in attendance are listed below. Other representatives from the organizations below may have also been in attendance, but are not included here if they did not speak during the meeting.

Name	Organization
Melissa Kasnitz	Center for Accessible Technology
Lee-Whei Tan	CPUC-Public Advocates Office
Christopher Hogan	CPUC-Public Advocates Office
Jieli Feng	CPUC-Public Advocates Office
Marshall Worsham	CPUC-Public Advocates Office
Paula Ham-Su	DNV-GL
Claire Palmgren	DNV-GL
Brian Arthur Smith	Pacific Gas and Electric Co.
Gail Slocum	Pacific Gas and Electric Co.
Hank Elgin	Southern California Edison
Carol Edwards	Southern California Edison
Cyndee Fang	San Diego Gas & Electric Co.
Jennifer Dowdell	The Utility Reform Network
David Cheng	The Utility Reform Network
Gabriela Sandoval	The Utility Reform Network

Consultant Team: Michelle Vigen Ralston and Jack Chang, Common Spark Consulting

Facilitator Takeaways

Data Collection

- Go beyond RASS: Main data collection for the Residential Appliance Saturation Survey (RASS) is complete, but the Essential Use Study could still recontact survey respondents for follow-up data collection.
  - Qualitative Data to Enhance Identification of Underutilization: Consider how the study can incorporate qualitative data to supplement the quantitative data collection from RASS to help identify energy underutilization by low-income customers, either through follow-up surveys or through comparative analysis with other datasets. The Low Income Needs Assessment and survey questions from the study conducted under PUC Section 745 can provide guidance on questions to identify underutilization.
  - Medical Device Use and Energy Needs: Consider how the study can capture data about households who have special medical-related energy needs, regardless if they are already enrolled in the medical baseline program. This could be captured by asking about specific medical equipment use needs or another method to be determined not based on equipment use. Some questions are included in RASS (Section M5), and other questions can be drawn from the baseline statute or other criteria used in practice by the utilities to establish eligibility for medical baseline.
  - Equipment Type: Consider how to better capture the differences within certain energy use types such as different types of computers and swimming pools where energy use or billing methods can vary. *Stakeholders are invited to review questions K1-K7 and provide any additional items to include or specify.*

Deliverables

- Datasets and Web Tool: The underlying data in the study should be made public to the greatest extent possible. All participants agreed that parties should be able to access data in a format that allows them to work with the data on their own to develop their own proposals around essential use.
- Workshop Training: A half-day or whole-day informal workshop should be held to teach parties how to use the web tool, and a public PowerPoint and notes could provide instructions to the tool as well.
- Reporting: Develop a high-level report including methodology, caveats, limitations, and how the data can support investigation of summary use. The report could also include summary outcomes, relevant trends, and comparative analysis – perhaps using the data to identify allowances based on current baseline allowances guidance (basic, all-electric, climate zones, current definitions) to provide a "baseline" of the data results.

Meeting Notes

1. Introduction

Michelle Vigen Ralston, the workshop facilitator, welcomed participants by asking one individual from each organization to introduce themselves and inviting them to participate in an ice breaker, naming a silver lining they've discovered while self-isolating during the ongoing coronavirus crisis. Ralston followed introductions by summarizing the goals of the workshop – level-setting on the progress and status of the Essential Use Study Draft; defining the scope of data collection; identifying other critical pieces of the essential energy use definition process; determining how the Residential Appliance Saturation Study (RASS) could support stakeholders' priorities; and identifying the study's final deliverables.

Gail Slocum of Pacific Gas and Electric Co. (PG&E) offered a procedural history of the Electric Essential Energy Usage Study. In August 2018, the California Public Utilities Commission (CPUC) ordered PG&E to develop a study plan as part of Phase 2 of the utility's General Rate Case. The CPUC later asked Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) (together with PG&E, the "Joint Utilities") to help develop the study plan along with PG&E. The Joint Utilities held two public workshops with interested parties in summer 2019. The Joint Utilities completed a joint study plan in November 2019.

The CPUC followed by holding a pre-hearing conference with PG&E and issued a scoping rule that ordered the essential use issue be bifurcated and expedited in PG&E's General Rate Case Phase 2. The Joint Utilities need to receive stakeholder comments and file a final study plan by April 1.

Brian Arthur Smith, of PG&E, said the Joint Utilities concluded that the latest RASS, scheduled to be released later this year, would fulfill the CPUC's order and be the most effective and expeditious way to complete the Essential Use Study. For the study, the Joint Utilities propose contracting with DNV-GL, the firm conducting the 2019 RASS as well as having run previous versions of the RASS. The Joint Utilities modeled their budget estimates off of the data collection study being conducted on San Joaquin Valley disadvantaged communities.

The CPUC's Affordability Proceeding (R.18-07-006) released its revised Affordability Metrics Framework, which provides guidance on income and cost-related analysis and includes some discussion on essential energy use. Smith noted that the original Staff Proposal on Affordability Metrics Framework was also included in the Joint IOUs Draft Study Plan served

in November. It was noted that the revised Staff Proposal had not been approved by CPUC decision yet, but that it was anticipated in June. Melissa Kasnitz of the Center for Accessible Technology (C for AT) noted that the timeline for a final CPUC decision on essential use could be up in the air with the coronavirus pandemic disruption.

The RASS is ideally conducted every three to four years, but Claire Palmgren of DNV-GL noted that it took a decade to follow up on the 2009 survey because the California Energy Commission (CEC) hit delays in finding funding and administering the request for proposal.

2. Data Collection

Ralston (Facilitator) opened discussion and sought input from stakeholders on data collection.

RASS Study Data and the Essential Use Study

Kasnitz (C for AT) asked whether the Joint Utilities intended to accept more data as a follow-up to the RASS. She expressed concerns that data collection may have already ended and said more follow-up data such as qualitative research can help determine whether low-income households are underutilizing energy due to financial pressures or other causes. She said more data could also help assess which customers are enrolled in the California Alternate Rates for Energy (CARE) program, which serves low-income households, and whether people who earn more than CARE's income threshold might still be underutilizing energy due to financial constraints. She also suggested looking at the Low Income Needs Assessment (LINA) for guidance, where energy insecurity and underutilization questions have already been asked in several survey iterations. She said the RASS could also ask about language spoken at home and whether the respondent was native versus foreign born.

Jennifer Dowdell, of The Utility Reform Network (TURN), said follow-up data collection could also better capture the energy usage of medical baseline consumers. Without such follow-up data, she said the study could still use existing demographic data to cross-reference customer types to get a better sense of energy usage by medical baseline customers. She added that the study should address how it will or will not handle possible long-term disruptions in work schedules and energy use patterns due to the coronavirus pandemic. Kasnitz concurred that employers might start allowing more telecommuting after the pandemic eases, which would drive up household energy use.

In response to Kasnitz's question about the completion of the RASS and the opportunity for additional questions, Slocum (PG&E) clarified that the Joint Utilities study plan submitted in November 2019 had specified that the RASS would be issued in March 2020 with the assumption that data collection would be completed by then. However, she said the Joint Utilities could still fill in gaps in the existing questionnaire with follow-on surveys. She also addressed Dowdell's coronavirus concerns, saying the study should use a baseline built off energy use patterns before the coronavirus crisis. If the pandemic permanently changes energy use patterns, the utilities will have to return to the Commission about possibly rerunning the RASS.

Smith (PG&E) added that DNV-GL had already combined RASS survey research data collected from tens of thousands of customers across the state with utility-provided billing and monthly consumption data; the results of the RASS were to be published soon. He underscored that the Joint Utilities could recontact RASS participant customers for follow-on research if new data needs emerged for the Essential Use Study. He said PG&E had added a few line items for additional data collection in its study budget.

Lee-Whei Tan of the CPUC said needed data have already been collected for the RASS survey and more money for data collection should not have to be allocated for the project. She also said the RASS could use examples of energy underutilization survey questions from a survey conducted pursuant to PUC Code 745 examining households facing economic hardship.

Paula Ham-Su of DNV-GL said the current RASS has an explicit and implicit sample design that can help detect energy underutilization. For example, the tool can identify similarly sized households living in similar-sized structures but using different amounts of energy.

Medical Baseline

Kasnitz (C for AT) said the RASS questionnaire should include detailed questions about the types of medical devices in households that run on electricity and ask for descriptions. She said the medical baseline program has been underutilized and that many eligible people are not enrolled. She said the program has generally not done enough to publicize its offerings and enroll enough eligible people. Due to that underutilization, the collected RASS data should look at people using the medical baseline program but also include the equipment use patterns of needy populations in the broader community that are not enrolled in the program.

Ham-Su (DNV-GL) said the study captures medical baseline households by using utility records but that such households are not part of the sample design. She also said the numbers of people on medical baseline is low. Slocum (PG&E) responded that the miscellaneous appliance questions in the study plan, section M5, talks about respirators and medical equipment. Dowdell (TURN) added that the M5 section also asks whether electricity or natural or bottled gas is used for respirators or any kind of medical equipment, but that the section doesn't ask about specific equipment types.

Hank Elgin, of SCE, said the medical baseline program is a separate allowance provided on top of regular baseline allowances and includes all medical related usage. Being additional, medical baseline doesn't fit the same 50% to 60% allocation criteria that the regular baseline includes. He also said the current baseline allocation method is easy to update. If the medical baseline information is included in the affordability metric on a regular basis, the Essential Use Study should be capable of being updated on a regular basis with those data. Running separate one-off studies poses lots of costs and operational difficulties. Overall, he said the RASS is exceptionally thorough and detailed.

Slocum (PG&E) gave a quick run-through of the background of the medical baseline program, which began when the original Lifeline energy statute sought to determine how much energy was used by individual appliance types. That statute also tried to create tier differentials for the basic residential rate based on that assessment. The methodology switched to an overall average percentage baseline structure with differentiation only for seasonality and whether the house was all electric or not. At that point, the medical baseline became a lump sum amount of additional baseline. She suggested that going forward, following up on the RASS could include creating detailed questions about medical equipment, as required in the original Lifeline statute. The legislature switched approaches because maintaining a list of equipment became cumbersome.

Kasnitz also recommended including a list of medical equipment in the survey. She reminded participants that the medical baseline program statue has a list of medical conditions that establish eligibility although utilities don't demand adherence to those categories of conditions. Slocum said utilities often identify any needed medical equipment to establish eligibility rather than medical conditions as determinants for medical baseline eligibility. She added that the medical baseline population often come in and out of the program.

Ham-Su said the medical baseline program represented a small part of the total RASS population and that medical equipment wasn't a necessarily accurate metric either of health-related energy needs. For example, she said someone could be homebound without medical equipment but still use more energy due to being home all day.

Ralston (Common Spark) offered that stakeholders were envisioning how the Essential Use Study data collection could include seeing how medical equipment broadly is affecting overall usage data. Smith (PG&E) suggested using medical baseline as another attribute in the modeling and looking at how much electricity use grows for medical baseline customers. Ham-Su said medical baseline is not in the current scope of work but the study could look at how many people have identified their use of medical equipment and whether that number was high enough to make a reliable calculation.

Lee-Whei Tan (CPUC) reminded workshop participants that a past questionnaire had been developed during the implementation of time-of-use rates asking about household energy use. She said those questions could be used as model for the RASS. Slocum agreed that using the past questionnaire could save extra time and work. Marshall Worsham, of the CPUC, also noted that research issued by Lawrence Berkeley National Laboratory – EPIC Project EPC-15-024 - on electrical device use included a list of equipment types serving the health and safety needs of residential customers. He also noted that the CPUC order required collecting building information such as construction materials. Elgin responded that the RASS does ask about the age of houses and building standards to identify building attributes.

Christopher Hogan, of the CPUC, said the RASS uses forecasting zones that are different from utility baseline instances or Title 24 territory zones. He sought confirmation from DVN-GL that the RASS' sample sizes produce valid statistical results for utility baseline territories. Ham-Su confirmed that the sample sizes likely did produce statistically significant results but that would have to be confirmed. Slocum said SCE and SDG&E use the same baseline territory boundaries as the CEC but that PG&E's baseline territories differ to some degree.

Equipment Types

Carol Edwards, of SCE, noted that energy use varied depending on different types of equipment even within a single equipment category. For example, typical computers use less electricity than computers designed for gaming. She said gaming computers shouldn't be considered essential energy use. Similarly, electric bikes might be lumped in with essential equipment such as wheelchairs in survey questions. Energy used to maintain swimming pools could also vary, given the differences in how energy is billed for owners and renters.

Palmgren (DVN-GL) responded that some of the RASS questions were broad in their scope. For example, one yes/no question asked whether the household had an electric bike, skateboard or electric wheelchair.

Slocum (PG&E) noted that under entertainment technology, questions K1 through K7 ask whether the household uses a specific list of equipment such as scanners, copiers and hub computers.

Hogan (CPUC) noted that the RASS might need to be expanded to include additional participants depending on whether electric vehicles (EV) and solar generation will be included as essential use. Ham-Su (DNV-GL) responded that not all electric vehicle drivers sign up for special EV electricity rates, which makes identifying and tracking EV-using customers more difficult. She said if EVs are defined as an essential use, DNV-GL would need to follow up, not necessarily in the form of additional questions but possible with other data sources. Slocum concurred that many EV drivers don't use the special EV rate. Cyndee Fang (SDG&E) said the RASS already asks about EVs such as the number of EVs in the household

and how long they charge for, which means they capture the EV usage of non-EV rate customers. She said people should look at the questions provided in Table 9.A.2 to see what's already in the RASS.

3. Deliverables and Budget

Web Tool and Datasets

Smith (PG&E) demonstrated the current RASS web tool, which he said would be the Essential Use Study's main deliverable. The RASS web tool features data types such as age, head of household, size of household and type of housing. Users can also use the tool to drill down on data that differentiate between residence types, age of housing and other details. Users can design a query to determine the essential use of a particular appliance, type of house, income level and other details to produce energy tables and reports. The tool provides results in PDF data tables that are cut in pre-determined ways. The Joint Utilities propose to ask DNV-GL to add to the RASS web tool any additional data that would still be collected for the Essential Use Study.

Dowdell (TURN) said the collected data need to be publicly available and able to be downloaded in a form that users can analyze on their own spreadsheets. She asked about the functionality of the data and whether the tool will function like a data cube, but with constraints on the granularity of the data that can be assessed. She also said U.S. Census data could be matched with essential use data to provide basic demographic and income information as further context.

Palmgren (DNV-GL) said underlying anonymized household data would be available upon request from the California Energy Commission, and that DNV-GL was not authorized to distribute those data. Web tool queries, however, produce live saturation tables with aggregated data that can be exported to Excel. Unit Energy Consumption are only available in static tables due to their sample sizes. Ham-Su (DNV-GL) said underlying data in already published tables could also be made available for use in Excel. She said that once data are approved for release, they can be released in any format desired by users. She added that U.S. Census American Community Survey data were already attached to the RASS database but can't be matched to specific households.

Slocum (PG&E) noted, as an alternative method for parties to receive more granular datasets, that in certain CPUC proceedings, PG&E already uses proprietary models with confidential data in which parties can work with the data at a high level of granularity using a non-disclosure agreement. Elgin (SCE) said the goal of the web tool was to let users access the same dataset and sources and produce their own results and definitions of essential energy usage.

Public Workshop and Tool Training

Smith (PG&E), earlier in the meeting, had presented the San Joaquin Valley data collection study as a model for estimating a budget for the Essential Use Study. He noted that the San Joaquin study included funding for a stakeholder presentation but in the Essential Use Study case, a stakeholder presentation might not be as useful and so anticipated allocating minimal if any funding in the budget for such a presentation. Slocum (PG&E) proposed holding a full-day or half-day workshop, not a formal presentation, that would teach parties how to use the web tool. Dowdell (TURN) agreed that such a

workshop would be helpful. Palmgren (DNV-GL) suggested producing a user guide for the web tool as well. She noted that DNV-GL was still receiving inquiries from users about how to use the 2009 web tool.

After discussion, participants agreed a web tool workshop with a PowerPoint presentation and notes would offer enough information to teach people how to use the tool. Tan (CPUC) said the presentation could include sample results that would show people how to work with the underlying model by manipulating the tool. Smith said a report could accompany the web tool largely to show how the tool was put together and could be used. Slocum added that a mechanism in the tool could help parties collaborate once they see the data.

Report

Smith (PG&E) also noted that it didn't seem like a report would contain much if the core of the study is the data collection and web tool. A report could include methodology, and perhaps analysis of essential use based on current definitions and approaches, but that the Joint Utilities were not anticipating putting forth a full analysis and proposal for an essential use definition.

Dowdell said TURN is interested in being able to construct its own interpretations with the dataset and wouldn't find as much value in a report with "a billion slices and dices." She said the Joint Utilities should still use the report as a vehicle to offer their viewpoints on the study, even if preliminary, along with the scope and caveats of the data.

Tan (CPUC) said the report's high-level outcomes could be organized by climate zones with cuts based on CARE, non-CARE medical customers and other criteria used by the CPUC's Affordability Order Instituting Rulemaking. Elgin (SCE) suggested presenting the results by current stratification of baseline allowances.

Slocum (PG&E) said the study will have to determine which percentage of average use for climate zones to set for the average baseline allocation, somewhere from 50% to 60%. Dowdell pointed out that 60% is a placeholder in the Affordability OIR pending completion of studies.

4. Wrap-up

Ralston quickly summarized the work of the stakeholders, from the presentation by PG&E to the discussion on data collection to deliverables. She noted that the facilitation team would be writing up notes so stakeholder input would be documented for the Joint Utilities as they work to complete their Final Study Plan by April 1.

Additional questions and comments were invited to be sent to Michelle Vigen Ralston at michelle@common-spark.com for inclusion in the workshop notes.

Attachments: Public Advocates Office Questions and Suggestions

The following was submitted on March 20 to Common Spark Consulting by Christopher Hogan for inclusion in these notes.

The Public Advocates Office:
Essential Use Study Plan Questions and Suggestions

Budget:

1. What is the difference between deliverables "Optional Phase II Data Collection" and "Data Collection Sampling & Implementation Plan"?
    a) If there will be additional data to collect, is this cost going to be covered by the budget for "Optional Phase II Data Collection"?
    b) If yes, why is there still a need to budget for "Data Collection Sampling & Implementation Plan" when the RASS data is going to be leveraged for the essential use study?
2. If the project for the essential use study is less complicated than the SJV DAC project, the cost for "Preliminary Results Draft Memo," "Draft and Final Report," and "Final Results Presentation" should be less expensive than the SJV DAC. However, these deliverables are currently allocated a maximum of 100% of the SJV DAC project. The IOUs should work with DNV GL to provide a reasonable estimate of the budget for this study.

Data Needs:

3. For Electric Vehicle, Net Metering, and all electric customers:
    a) There should be a filter to include or separately analyze these customers from the essential use analysis, due to their less common usage needs, in the proposed web tool.
4. Anonymized raw data should be provided to all parties, so that parties can perform their own essential use analysis.
5. Given the RASS survey sample size is scaled to the CEC Forecasting Zones (which are not the same as the CEC Title 24 Zones and Baseline territories):
    a) Is there an adequate sample size to produce accurate estimates of essential usage for customers by utility baseline territory?
    b) Is there an adequate sample size to estimate essential usage for customers by utility baseline territory and:
        1. CARE/FERA/Non CARE-FERA status
        2. All Electric versus basic customer status
        3. Net metering status
        4. Electric Vehicle owner status
        5. Medical Baseline status

Study Proposal:

6. Is conditional demand modeling the best approach for estimating essential use? What's the justification? What other modeling approaches have been considered?
    a) Alternative methods that were considered should be included in the final report.
7. The Essential Use Study proposal filed by the utilities should include justification for leaving out any factors or variables that were ordered in (D.) 18-08-013 to be included in this study.

Stakeholder Meet & Confer
Prioritize Web Tool Variables and Features

Meeting Notes | Submitted November 19, 2020

Friday, November 13, 2020 from 10:30am-1:30pm
Online Meet and Confer
Hosted by: Pacific Gas and Electric Company
Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

This document contains four sections:

1. Attendees
2. Facilitator Takeaways
3. Notes

Attendees

Those in attendance are listed below. Other representatives from the organizations below may have also been in attendance, but are not included here if they did not speak during the meeting.

Name	Organization
Melissa Kasnitz	Center for Accessible Technology
Cynthia Lee	CPUC-Public Advocates Office
Christopher Hogan	CPUC-Public Advocates Office
Xian Li	CPUC-Public Advocates Office
Paula Ham-Su	DNV-GL
Claire Palmgren	DNV-GL
Jonathan Taffel	DNV-GL
Ben Johnson	DNV-GL
Brian Arthur Smith	Pacific Gas and Electric Co.
Cynthia Fang	San Diego Gas & Electric
Aaron Lu	San Diego Gas & Electric
J.C. Martin	San Diego Gas & Electric
Alana Hammer	San Diego Gas & Electric
Sandra Williams	San Diego Gas & Electric
Hank Elgin	Southern California Edison
Reginald Wilkins	Southern California Edison
Cyrus Sorooshian-Tafti	Southern California Edison
William Briggs	Southern California Edison

Prapti Gautam	Southern California Edison
Wayne Yu	Southern California Edison
Cyndee Fang	San Diego Gas & Electric Co.
Jennifer Dowdell	The Utility Reform Network

Consultant Team: Michelle Vigen Ralston and Meghan Harwood, Common Spark Consulting

Facilitator Takeaways

- The Facilitators encourage DNV-GL and the Investor-Owned Utilities (IOU's) to look at the broader categories of each variable, and remember that the stakeholders are willing to do their own work if granted flexibility and granularity within the tool – including rolling up data to reach statistical significance on their own and adjusting to use proxy variables.
- The team should also pay close to attention to when certain variables can be used as proxies for a specific desired outcome. Where are clear priorities, but there is often flexibility in how the tool enables a user to get to that outcome. The team should spend the time reviewing and referencing these notes over time to inform those decisions.

Meeting Notes

1. Introduction

Brian Smith of Pacific Gas and Electric Co. (PG&E) started the meeting with a safety check, reminding folks of necessary preparatory safety measures for both COVID-19 and earthquake preparedness. He highlighted the main points of contact for any issues that arise for residents, if they believe they are at risk from gas exposure or leakage, downed lines, or others incidences.

After the safety check, Michelle Vigen Ralston, the session's facilitator, welcomed participants and highlighted the desired outcomes for the Meet and Confer: providing back to PG&E and the other IOU's a set of variables and features that were highest priority for the Web Tool, along with some of the broad questions advocates wanted answered by the tool so that the PG&E/IOU's and DNV-GL could use those as context while they developed the tool. Ralston emphasized that, using the input from this discussion, the PG&E/IOU's and DNV-GL team would make every effort to incorporate stakeholder priorities and requests (within normal and legal constraints). Ralston then proceeded to asking each participant to introduce themselves and participate in an ice breaker.

2. Background: Plan Status, Factors and Limitations of the Web Tool

Brian Smith of PG&E started by offering a summary and reminder of the procedural history and regulatory background of the Electric Essential Energy Usage Study (EUS). The final decision on the EUS ordered the electric IOU's to Meet and Confer with stakeholders, to determine the scope of the enhanced Web Tool. Smith identified that the final Commission decision had enabled PG&E to use a

substantially larger budget for the Web Tool's creation, and that the goal of this Meet and Confer was to gather input to make the tool as useful as possible.

Smith reminded participants that the EUS has been underway for 2+ years, starting with an order for PG&E (which has now been expanded to all the IOU's). The other two IOU's, Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E) are contracting with PG&E and DNV-GL through a cost share agreement to proceed with the study and Web Tool creation. Smith highlighted that the Web Tool will be the more detailed tool resulting from the study, with a comprehensive report issued alongside it that will provide an overview of certain findings, and an overview of the Web Tool's capabilities. DNV-GL has also committed to maintaining the Web Tool for the coming years.

The Meet and Confer will provide further information on how to prioritize variables, and on their relative significant for stakeholders. Smith reminded the attendees, though, that prioritization is not always an indicator of what will be possible. Limitations could include budget availability, how granular the Residential Appliance Saturation Study (RASS) data is, and how large the sample size is for data points. Limitations on granularity will have implications on what statistically relevant information can be drawn in the Web Tool, as there may be certain variables or data sets where insufficient data will make cross-analysis or overlay difficult. Smith did highlight that they will have some additional room in the budget to get additional information from RASS respondents, particularly qualitative data around underutilization.

Jenn Dowdell from The Utility Reform Network (TURN) requested that team remind stakeholders about the way they are holding the data locationally, and what the geographic granularity was. Claire Palmgren (DNV-GL) responded that, starting with the 2019 RASS, the sample was developed from utility service territories, including the IOU's as well as SMUD and LADWP. Other overlays that will be included in the enhanced Web Tool will include more detailed information from California Energy Commission (CEC) forecasting on energy usage, Title 24 Climate Zone Data, Zip Codes, and other underlying information about respondents. She reminded the group that this enhanced Web Tool will be entirely new and independent from the original 2009 CEC-sponsored Web Tool, so that the data can be cut by zip codes and not just utility territory. She also emphasized that they hope the new Web Tool will be significantly more functional and flexible, to provide data in new ways, than the 2009 tool. Paula Ham-Su (DNV-GL) emphasized that they wouldn't have the statistical representation of all zip codes as the sample size isn't large enough, but that they are discussing doing 3-digit service territories. Dowdell confirmed that a 3-digit zip code is helpful, and much preferred over utility service territory.

3. Guiding Questions for Prioritization of Web Tool Variables

Ralston (Facilitator) then opened the discussion about prioritization of Web Tool variables. She started by framing the conversation with two key questions – what kinds of questions are important to essential usage? What questions do you hope the Web Tool will answer? Before diving into each variable individually, Ralston asked the group to start with an open brainstorm about these questions. She provided an initial example of what a stakeholder may as of the Web Tool: I would like to be able to understand a definition of essential usage that has more inclusive aspects than past analyses, such as incorporating and raising question about different segments of the population not previously included. Can the Web Tool do that? Smith (PG&E) responded with another example: What is the average usage of kWh for every major appliance?

Palmgren (DNV-GL) provided some additional context to kick off the brainstorm. She mentioned that the CEC-sponsored RASS Web Tool from 2009 does provide estimates of kWh for every major appliance but they're static tables. One of the changes the new EUS Web Tool will provide is allowing stakeholders to slice and dice estimates of usage by different attributes. Dowdell (TURN) asked if it was being contemplated that users would be able to construct their own package of appliances to create an essential usage use case. For example, a refrigerator, electric stove, electric hearing combination, with an associated average usage. Palmgren responded that the initial thought is they would make something like this happen, with bucketing variables and usage based on appliances. However, she emphasized that this Meet and Confer is being used to determine what the priority usages are as input for what they should build. TURN's request is one potential functionality to be considered.

Melissa Kasnitz (Center for Accessible Technology) added to the discussion that important variables to TURN are appliance types, building features, and climate zones. She also noted that it's important to be able to determine the essential usage across those variables dependent on things like occupant number, income brackets (at least low or non-low income), multi- or single-family housing, and an ability to tease out appliance age discrepancies (in particular for rental properties), and respondents with a reliance on medical usage.

Kasnitz also highlighted a desire to better understand patterns essential usage patterns related to underutilization. Ralston highlighted that, as part of this process, there will be more work on underutilization, both acquiring new quantitative and qualitative data. She highlighted that there had been a commitment from the IOU's and DNV-GL that this information will be shared, whether in the Web Tool or in the paired report when qualitative. Smith mentioned that they had already agreed that underutilization is important, but also sensitive, and not something that respondents are always easily persuaded to discuss and share information about. They plan to hire a firm that specializes in similar sensitive interview topics to help with outreach to specific community members, so they can get a more nuanced understanding of the when and why around underutilization. It's unlikely that all of this information will be represented in the Web Tool, given that it will be collected quantitatively, so it will not likely be able to be overlayed with other variables like climate zone (though it will be shared by IOU territory).

At the end of the discussion, and in response to a question from Kasnitz, Ham-Su spoke to the interplay between the Web Tool and the report. She emphasized that the report will not be able to include everything there is to say and conclude from the data being used in the Web Tool. It will likely end up including 10 or more examples of how they quantified underutilization, for example, with estimate consumption in low-income populations. The report will be designed so that the Web Tool will be directly referenced.

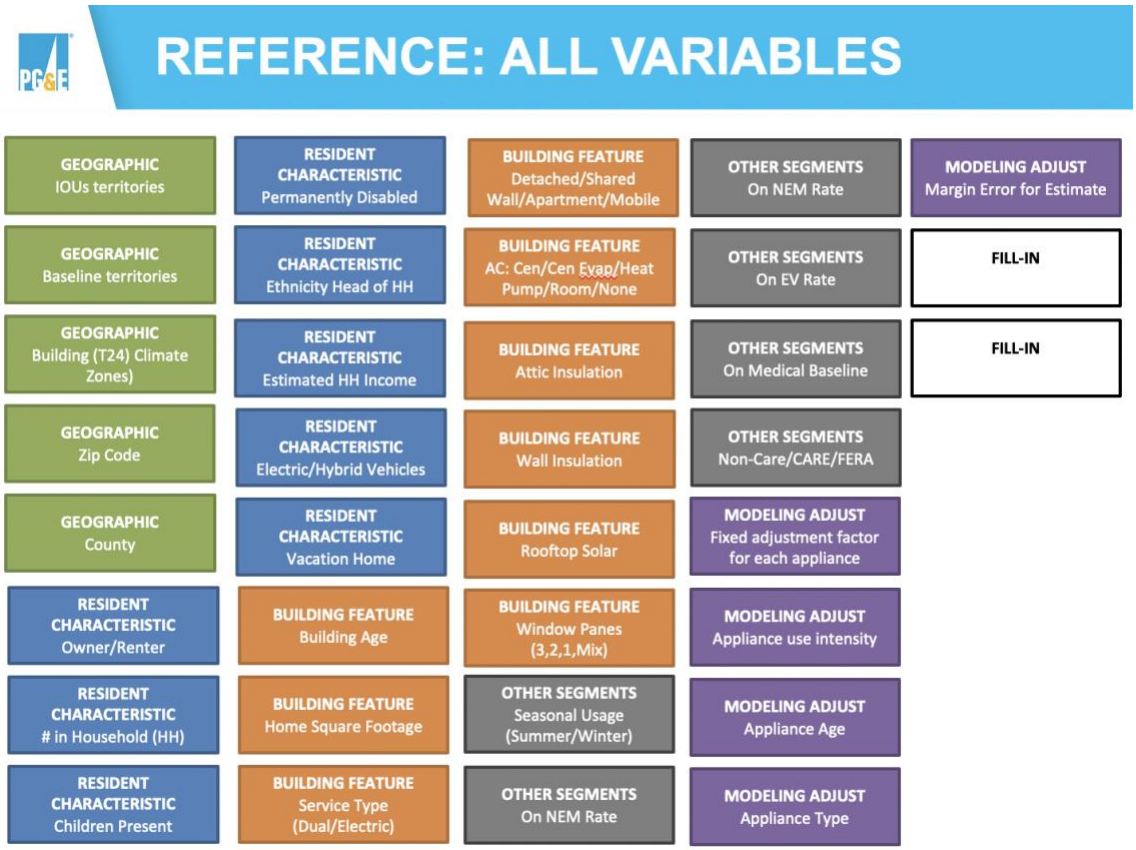
4. Prioritization of Web Tool Variables, Survey Results

Ralston (Facilitator) then shifted the conversation to visit and summarize the survey responses the team received in the weeks leading up to the Meet and Confer about priority variables for the Web Tool. As she reminded the group, CPUC-Public Advocates and TURN both responded to a survey collecting their feedback on the ranked prioritization of variables. Each respondent ranked certain potential variables for the Web Tool as "Must Have", "Like to Have", and "Wish to Have". The survey resulted in:

- 8 Decision variables, which are required as a result of the initial Decision;
- 7 Consensus variables, where all parties agreed they were "Must Have";
- 6 Semi-Consensus variables, with as a combination of "Must Have" and "Like to Have" by both parties;
- 7 Partial-Consensus variables, where one respondent voted as a "Must Have"; and
- 4 No-Consensus variables, where there was one vote for "Like to Have".

Ralston emphasized that the results of the survey are a starting point for discussion – but that it's a flexible construct, open to adjustment and shifting. She highlighted that the purpose of the exercise to come was to spend less time on the Decision and Consensus variables, and spend most of the time on the Semi-Consensus, Partial-Consensus, and No-Consensus variables (in that order).

Summary: Variables Under Consideration



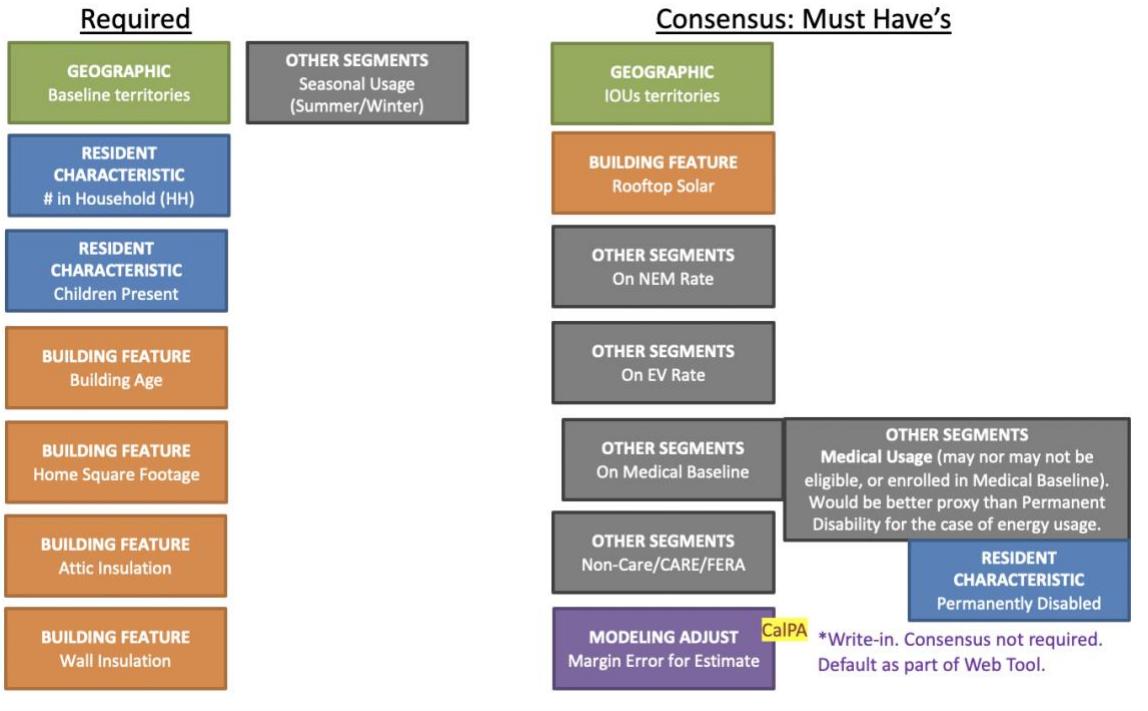
Consensus Variables

The following variables were all agreed upon as consensus variables – both required by the Decision, and universal "Must Have" variables. Ralston opened the meeting for stakeholders to provide any comments on whether they agreed that this was the right list of consensus variables, and if there were any comments on this list.

Kasnitz (CforAT) confirmed that the **Resident Characteristic - Permanent Disability** variable could, and likely should, be replaced by a **Medical Usage** variable (inclusive of anyone with a medical energy use, even if not eligible for Medical Baseline) and **Medical Baseline**. Kasnitz noted that there is of course overlap, but not exclusively – oftentimes, a person may not be eligible for programs and designation as 'permanent disability' in a medical baseline, but may use a CPAP for example. For the purposes of measuring energy use for medical purposes, being able to identify a household with a medical usage is a more accurate measure.

New Variable: Medical Usage

A new variable, Medical Usage, was identified as a better data point than Medical Baseline rate usage or Permanently Disabled. Medical Usage, is envisioned to include medical energy usages, that could be but is not limited to energy needs from a disability, disease, condition, etc. Medical Baseline is known to be significantly under-enrolled. The new variable would better capture the needs of those with medical energy needs and provide insight to ensure better enrollment in Medical Baseline, a critical program to support essential energy use.



Semi-Consensus Variables

Ralston then moved the group to focusing on Semi-Consensus variables. This is where the bulk of the time and discussion were focused, and the final prioritization is summarized below.

To kickoff the conversation, Kasnitz focused on the **Resident Characteristic - Owner or Renter** categories. She requested that these be divided instead into single and multi-family designation. Kasnitz agreed **Building Feature - Detached/Shared Wall/Apartment/Mobile** can serve the same function – and that this should be prioritized.

Hank Elgin (SCE) posed the question of if the ultimate goal should be to estimate the energy usage per group, or essential usage specifically. He highlighted that different variables will impact total vs. essential usage in various ways – for example, energy data by zip code may not translate into dramatic differences in energy consumption, though climate zone likely would. He urged the group to keep the ultimate target in mind when identifying where there could be proxies for certain variables and where there may be other usage data that could help stakeholders determine what they need (within or outside the RASS and EUS).

Proxy Variables

Multiple variables were identified as potential and/or preferrable proxies for specific data. When possible, those should be prioritized. When the decided variable is not feasible with sufficient granularity, the Web Tool should reference the preferred backup in these notes.

These include:

- A new variable Other - Medical Usage compared with Resident Characteristic - Permanently Disabled
- Building Type – Detached/Shared Wall/Apartment/Mobile compared with Single-Family vs. Multi-Family
- (potentially) Service Type - Dual/Electric compared with a modeling adjustment for appliance type.

Ralston mentioned that the hope is for DNV-GL to use this exact conversation to determine potential proxies based on stakeholders needs, including where users of the Web Tool can use it for much broader needs and questions than simply measuring essential usage. Palmgren highlighted that there is some modeling involved in the data collection – which means that some variance will be included, but there may not always be statistically sound data for every variable depending how much slicing and dicing of the data happens and is needed. Dowdell (TURN) reiterated, though, that in an ideal scenario the stakeholders would be given data with as much granularity as possible, so they can do their own aggregation and achieve statistical significance in different scenarios, understanding that sometimes that may mean measuring a variable (and rolling up more granular data) by **zip code**, sometimes by city, sometimes by county.

Ralston then opened up the conversation to the remaining variables.

- Dowdell offered that the **Resident Characteristic - Ethnicity of Head of House** is a high priority variable for TURN.
- On the **Appliance** related variables, Palmgren (DNV-GL) posed the question if stakeholders would like the ability to make adjustments so they could see changes in energy usage for different ages or older appliances, for different types of appliance, etc. Elgin mentioned that a feature like an adjustment on appliances could help users understand what the Essential Usage should be, and

what biases may exist if there are outliers. He agreed that having this as an adjustment to remove bias would be helpful.

- Turning to **Resident Characteristic - Electric/Hybrid Vehicles** as a variables, Dowdell was in agreement with CPUC-Public Advocates that this should be an important variable. Ham-Su (DNV-GL) reminded participants that the data did not show how much usage went to Electric Vehicle charging, but just total energy usage for homes with EV's in comparison with homes without them.

At this point, the group broke for lunch. When they returned, they revisited the remaining Semi-Consensus variables.

Chris Hogan (CPUC-Public Advocates) re-enforced the importance of **Electric/Hybrid Vehicles** as high priority, in order to parse through data with the ability to filter out certain customer categories with atypical usage (like those with EV's) for comparative purposes. Palmgren highlighted that only 6% of participated households had EV's which if distributed across another variable like **Zip Code**, could result in a very small sample size.

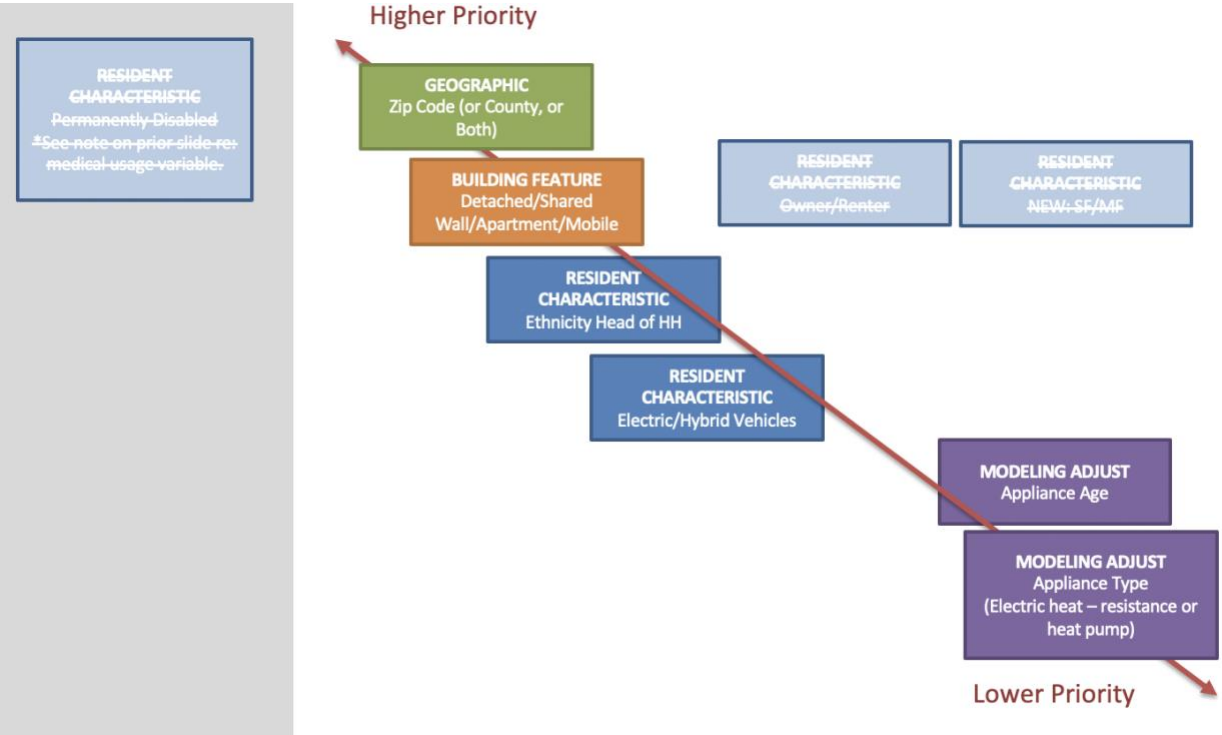
Dowdell agreed and understood, but also requested for the granularity to be made available to the users to manipulate themselves into buckets of statistical inference. She gave the example of EV charging – saying that it may be sufficient oftentimes to know the number of EV vehicles by utility territory, but whether it's in an owner or renter situation is also important. From a policy perspective, renters may not be incented to have their own EV charging as they are likely charging elsewhere – so that charging won't show up in their essential usage even if they're labeled as EV owners.

Sample Size and Granularity Threshold
It is recommended that the IOUs and DNV-GL use as low of a margin of error threshold as possible related to presenting data that can provide potential statistical inference, allowing users to have maximum potential granularity to manipulate and roll-up data into a statistically significant unit or model themselves.

Ralston summarized the discussion, stating that going as granular as possible is ideal so that users can roll up data to the level that's statistically relevant for their inquiry. Palmgren agreed with the conclusion and stated that one approach could be to establish a certain margin of error threshold, below which statistical inference isn't possible, and present all level of granularity above that threshold. Dowdell agreed with that summary, and asked that the DNV-GL team simply make that threshold known to the stakeholder group. Hogan also noted that another factor in establishing the threshold should and would likely be based on when sample sizes get too small from a customer confidentiality perspective.

Hogan then turned to the issue of sample sizes, and available modeling adjustments. He emphasized that while they stand by their prioritization of variables, CPUC-Public Advocates understands there will be areas where sample sizes are too small – and they want to simultaneously prioritize variables with good efficacy. Hogan also asked about **Modeling Adjust - Appliance Age and Appliance Size** as a variable. He had originally been under the impression that this would be included because it was included in the final decision, but now realized that they were meant to allude to an adjustment in the data as opposed to a toggle for determining energy usage with/without certain appliance.

The final prioritization for the Semi-Consensus Variables is below. **Resident Characteristics - Owner/Renter and Single-Family/Multi-Family** were demoted in favor of **Building Feature – Detached/Shared Wall/Apartment/Mobile**. The group did not that the latter is preferable as a proxy, if it can be included in the Web Tool with significant granularity, the other variables would be helpful to have if it is low cost to include. **Resident Characteristic- Permanently Disabled** was also removed, in favor of the Confirm Consensus Variable **Other Segment – Medical Baseline** and **Other Segment – Medical Usage**.



Partial-Consensus and Like to Have Variables

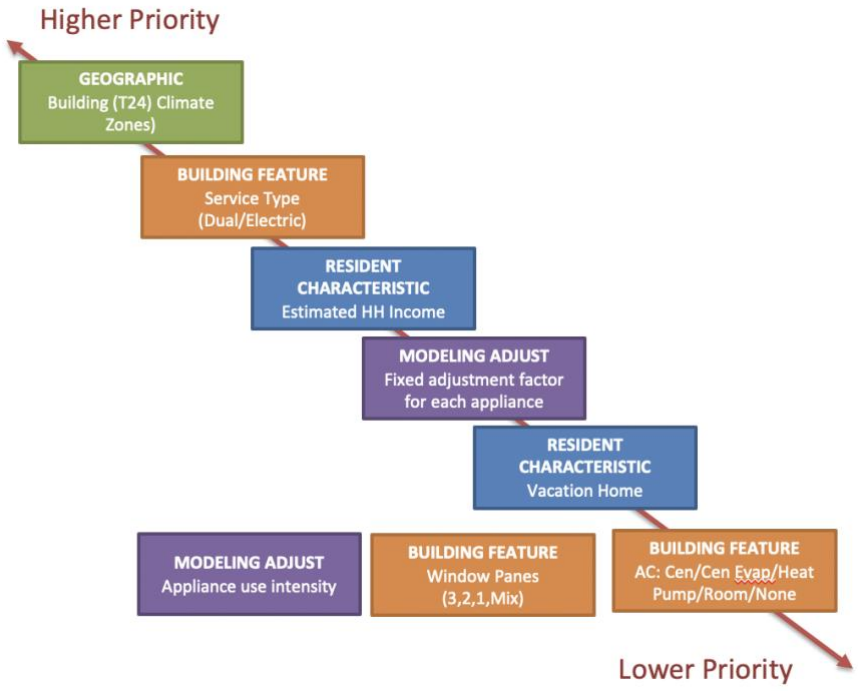
Finally, Ralston introduced the partial-consensus variables. As **Building Feature – Detached/Shared Wall/Apartment/Mobile** had originally landed in the "Like To Have" variables from the survey, Dowdell and Kasnitz one more time emphasized that they would instead move this to the highest priority item in replacement of **owner/renter**. Hogan emphasized that **Geographic - Building (T24) Climate Zones** are already part of RASS, and they placed the variables low on the scale *under an assumption it would be easy to implement.* **Geographic - Building (T24) Climate Zones** continued to be a nice to have.

Hogan also discussed that the **Resident Characteristic - HH Income** and **Vacation Home** were, within this category, high priority to just be able to filter them out. It's lower priority otherwise. Most important for CPUC-Public Advocates on this list was **Service Type (Dual/Electric).** The **Modeling Adjustment – Fixed Adjustment for Appliances,** Hogan mentioned, had been discussed in a previous workshop as an important tool in looking at the intensity of each individual appliance, including across climate zones. Hogan concluded he would rank this in the middle, below **Service Type** but above **HH Income** and **Vacation Home**. On the **Fixed Adjustment for Appliances** variable, Elgin mentioned that there may be an opportunity to identify fuel mix or dual-fuel vs. all-electric designation using this variable depending on

sample size and other data. DNV-GL was encouraged to keep this in mind as the ultimate goal – and Elgin drew the example of being able to model to determine an estimate of essential usage for a household of 6, based on data from households of 1, 2, 3, 4, and 6. If there was a robust enough sample size, a user could create a model to determine the estimated usage. Dowdell reiterated here, though, that TURN would prefer to get as granular of data and direct observation as possible in this instance themselves and do the modeling themselves.

To wrap the discussion up, the group turned to the final 'Like to Have' variables. Hogan mentioned that his votes in the survey for these listed Building Features was based on his understanding that they were included in the decision and in RASS questions already and would be easy to include. For Appliance Use Intensity, Hogan's interpretation of the model use adjustment was to be able to scale down the average usage results reported through the RASS down to an Energy Usage result.

The summary of the final two buckets of variables, Partial Consensus and Like to Have buckets, is included below:



5. Wrap-up

Ralston (Facilitator) quickly summarized the work of the stakeholders and checked the final prioritization. She noted that there were a few areas for continued discussion and input – including things such as:

- To better understanding medical usage as a variable (and how this variable might be collected and added), and what the best variable would be as a proxy for Permanently Disabled for the time being

- That **Building Feature variables** had risen to the top, and that **Detached/Shared Wall/Apartment/Mobile** was preferred to **Single-Family vs. Multifamily**, though the latter is high priority if the former is too challenging as a proxy
- That direct observations of appliance bundling would be preferable for users to manipulate themselves
- That **T24 climate zones** are nice to have if easy but utility territories could suffice; and
- That understanding the role of sample size is important and finding proxies is useful, while still making granular levels of data available when possible.

Ralston noted that the facilitation team would be writing up notes for the IOU team before the end of the following week, to support making the pending CPUC deadline. DNV-GL and PG&E noted there would be additional public comment opportunities in the implementation period itself. The final EUS Draft Timeline is copied below.

Study Activity	Approximate Timeline
Study Initiation and Contracting	November 2020 – January 2021
Joint Study Execution	January 2021 – July 2021
Preparation of Draft Report and Web Tool	August – September 2021
Public Workshop on How to use the Web Tool	October 2021
Public Opening Comments on Draft Report	November 2021
Public Reply Comments	December 2021
Completion of Final Report and Submittal of Tier 2 Advice Letter	January 2022 – February 2022
Approval of Advice Letter	April 2022

Contact Information

Additional questions and comments were invited to be sent to Michelle Vigen Ralston at michelle@common-spark.com for inclusion in the Meet and Confer notes. Key study contacts at the electric IOU's included Brian Smith from PG&E at b2sg@pge.com, Hank Elgin from SCE at hank.elgin@sce.com, and Cynthia Fang from SDG&E at cfang@sdge.com. For DNV-GL, the lead contacts are Claire Palmgren at Claire.palmgren@dnvgl.com and Paula Ham-Su at paula.ham-su@dnvgl.com.

Stakeholder Meet & Confer
Draft Guide for Qualitative Interviews

Meeting Notes | Submitted Friday, July 23 2021

Tuesday, July 20 2021 from 9:30am-12:00pm PT
Online Meet and Confer
Hosted by: Pacific Gas and Electric Company
Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

This document contains three sections:

1. **Attendees**
2. **Facilitator Takeaways**
3. Meeting **Notes**

Attendees

Those in attendance are listed below. Other representatives from the organizations below may have also been in attendance, and may be inadvertently left off this list if they did not speak during the meeting.

Name	Organization
Melissa Kasnitz	Center for Accessible Technology
Paul Goodman	Center for Accessible Technology
Christopher Hogan	CPUC - Public Advocates Office
Alan Siebuhr	CPUC - Public Advocates Office
Eileen Hlavka	CPUC - Energy Division
Ankit Jain	CPUC - Energy Division
Bridget Sieren-Smith	CPUC - Energy Division
Sarah Lerhaupt	CPUC - Energy Division
Cheri Chan	CPUC - Energy Division
Lynn Marshall	California Energy Commission
Paula Ham-Su	DNV-GL
Miriam Goldberg	DNV-GL
Claire Palmgren	DNV-GL
Jonathan Taffel	DNV-GL
Amber Watkins	DNV-GL
Brian Arthur Smith	Pacific Gas and Electric Co.
Gail Slocum	Pacific Gas and Electric Co.

Chris Kato	Pacific Gas and Electric Co.
Brittany Malowney	San Diego Gas & Electric
J.C. Martin	San Diego Gas & Electric
Hank Elgin	Southern California Edison
Cyrus Sorooshian-Tafti	Southern California Edison
Luis Gutierrez	Southern California Edison
Prapti Gautam	Southern California Edison
Reginald Wilkins	Southern California Edison
Wendy Ethier	Southern California Edison
Carol Edwards	Southern California Edison
Dan Bausch	APPRISE
David Carroll	APPRISE
Nat Treadway	DEFG
Alexia Retallack	Pioneer Community Energy
Sharon Cohen	Sempra Energy

Consultant Team: Michelle Vigen Ralston, Meghan Harwood, Suhaila Sikand, and Katie Wu - Common Spark Consulting

Facilitator Takeaways

- The Facilitators encourage all interested stakeholders and parties to continue to provide direct feedback to the group (including DNV, APPRISE, and investor-owned utilities) on both the Draft Qualitative Interview Guide and Web Tool through the upcoming July 30th and August 6th meetings, to ensure that Qualitative Interviews capture the most relevant and useful information, and the Web Tool is as useful as a product as possible.
- The DNV and Investor-Owned Utilities (IOUs) should pay close continued attention to the Web Tool variables, ensuring that, when prioritization or substitution needs to occur based on sample sizes and total data collected, the final outputs are still most useful for individual stakeholder needs and use cases. The team should spend the time reviewing and referencing these notes over time to inform those decisions.

Upcoming Meetings

- Stakeholders will be invited to a Deep Dive Discussion on the Qualitative Interview Guide on July 30th between 2-3pm PT.
- The next Public Project Meeting for the EUS will be on August 6th between 10am-12:30pm.

Meeting Notes

1. Introduction and Background: Essential Energy Use Study

At the outset of the meeting, Michelle Vigen Ralston of Common Spark Consulting welcomed and introduced participants. Brian Smith of Pacific Gas and Electric Co. (PG&E) started the meeting with a safety check, reminding folks of necessary preparatory safety measures for both the COVID-19 Delta Variant and earthquake preparedness. He highlighted the main points of contact for any issues that arise for residents, if they believe they are at risk from gas exposure or leakage, downed lines, or other incidents.

After the safety check, Ralston (Facilitator) walked folks through the meeting agenda and objectives, noting that the goals of the meeting were to level-set among stakeholders on both Timeline and Work Plan for the Essential Use Study, and to present and discuss the Draft Guide for Qualitative Interviews. Smith (PG&E) walked the attendees through the objectives for the meeting, outlined below:

- Refresh participants on what the team has accomplished so far;
- Refresh and confirm the work plan to achieve the study objectives;
- Review stakeholder engagement timeline and opportunities;
- Present the plan for Qualitative Interviews (including the Draft Interview Guide), and discuss and receive feedback;
- Present an updated plan for the Web Tool, and discuss and receive feedback;
- Discuss Timeline and Next Steps.

Regulatory Background

Smith (PG&E) started the session by offering a summary and reminder of the procedural history and regulatory background of the Electric Essential Energy Usage Study (EUS). In D.20-09-021, dated Sep. 24, 2020, the EUS and related budget were approved, and the electric IOUs were directed to meet and confer with stakeholders to determine the precise scope for an enhanced Web Tool. A meet and confer session was held on November 13, 2020, with interested parties and stakeholders, which helped determine and prioritize variables for the Web Tool's creation. On December 28, 2020, SDG&E filed a status report on the results of the meet and confer, and sent the report to the five relevant service lists. SCE then executed a contract with DNV to execute the EUS, and the follow-on stakeholder meetings were scheduled. As follow on to the November 2020 Meet and Confer, which helped determine and prioritize variables for the Web Tool's creation, the goal for today was to continue to engage stakeholders and gather input to make the EUS and Web Tool as useful as possible.

Recap of November Meet and Confer

Ralston (Facilitator) then reviewed the outcomes and results from the November Meet and Confer. At that meeting, the stakeholder group went through a process of ranking the 'Must Have' and 'Like to Have' variables for the EUS Web Tool, and mapped out their priority variables to inform what will be in the final product. Stakeholders informed the upfront list of all desired variables, and provided input both via advanced survey and in real-time to inform the prioritization. The group also discussed how DNV should make choices about which variables to include based on different contingencies, use cases, and potential proxy variables for desired end results. The final variable prioritization from the November 2020 meeting is captured in the Formal Report from the November Meet and Confer.

2. EUS Work Plan and Timeline Recap and Discussion

Reggie Wilkins of Southern California Edison (SCE) then began a presentation to the group about the Work Plan and Timeline for the EUS. He reminded attendees of the overall EUS Objectives - which are to:

1. Develop a model of what constitutes essential use for residential customers of PG&E, SDG&E and SCE;
2. Provide information that supports the (i) determination of whether residential customers are meeting their basic electricity needs at a reasonable cost, (ii) designate a baseline quantity of gas and electricity that are necessary to supply a significant portion of the reasonable needs of the average residential customer, and (iii) evaluate what electricity usage is essential for differently situated customers throughout California.

He then discussed the progress on each of the Tasks for the EUS Work Plan, captured below. The Study Team includes representatives from DNV, APPRISE, and the investor-owned utilities, as well as interested stakeholders who demonstrate interest and indicate as such to those organizers.

Task 1: Project Management and Stakeholder Coordination

The IOUs and DNV have convened a Study Team that will meet regularly, no less than monthly, to approve the work plan, define the parameters and analysis required to estimate essential energy use, discuss the Interview Guides and qualitative inputs, and continue to host and get feedback from stakeholder meetings. All decisions and discussions from the Study Team meetings will be reported in Monthly Status Reports to interested stakeholders. The study work will continue to be informed by the existing work from the California Residential Appliance Saturation Study (RASS).

Task 2: Qualitative Interviews

Wilkins (SCE) continued to Task 2, the Qualitative Interview stage. He informed the group that, while the existing RASS data is helpful, the EUS plans to supplement that data with a minimum of 75 qualitative interviews with 2019 RASS respondents across the three IOU territories. The interviews will be conducted with customers across variables to gain useful customer perspective. To facilitate the Qualitative Interviews, DNV will leverage 2019 RASS data and any additional information from each IOU (additional data may include updated contact information, rate, CARE/FERA status, medical baseline, etc.). DNV will ensure such data complies with all Customer Privacy Requirements prior to submitting to SCE, provide a

Draft and Final version of the interview guide, and will provide a Draft and Final version of the results memo.

Wilkins (SCE) reminded folks that, while the RASS is a critical resource, it wasn't designed to estimate Essential Usage. The purpose of this EUS is to supplement the RASS with additional information to better understand and model Essential Use.

Task 3: Additional Data Collection

Qualitative Interview respondents will also be leveraged for additional data collection, consisting of up to ten additional questions to be agreed upon in collaboration with stakeholders. This additional data will include, but not limited to, customers enrolled in medical baseline, customers who may be eligible for medical baseline but who are not enrolled, and customers whose medical needs may not establish eligibility for medical baseline. An emphasis on these customer segments that the RASS has less data on is critical. The Study Team will approve draft and final versions of the questionnaire, including opportunities for stakeholder feedback, and will approve draft and final versions of summary of data collected.

Task 4: Modeling and Quantitative Analysis

Task 4 involves additional modeling and quantitative analysis, once all of the additional data has been collected. An example of the modeling and analysis process that Wilkins (SCE) presented was around air conditioning usage. Since air conditioning may be considered as an essential use of electricity at certain temperature thresholds, the Study could use Degree Day Normalizations and Conditional Demand Analysis to estimate the proportion of customers at home not utilizing air conditioning, even as outside temperatures suggest usage is appropriate. There are additional variables around site usage that can also be considered in that more detailed analysis, including presence of solar, EV charging, certain appliance types, and more. DNV will provide Draft and Final versions of the Modeling and Analysis Plan to be approved by the Study Team.

Task 5: Base Web Tool (Dashboard)

The creation of a Web Tool (Dashboard) will allow users to interact with the study datasets, featuring the following functionality:

- Select the end uses to include in the estimated usage;
- Filter on characteristics of households in dataset to include or exclude from the query;
- Choose the variables to group the results (the "by" variable(s) in the crosstabulation);
- Produce cross tabulations of results including sample sizes, populations represented and produce mean estimates of usage.

DNV will provide to the Study Team both a Draft and Final version of scope of Web Tool functionality, a user's guide, a training deck, a staging version of Web Tool for stakeholder review, a final version of the published version of the Web Tool, a Draft and Final version of Public SaaS Data for SCE's review and approval, a training workshop, and general support such as, bug fixes and code corrections to correct software malfunctions, and applying relevant security updates for seven years. The Web Tool is meant to be accessible for stakeholders to understand and evaluate the data, and stakeholder input will continue to be critical.

Task 6: Added Functionality for the Web Tool

As part of Task 6, Wilkins (SCE) then described the enhancements and added functionalities that will be made to the Web Tool over time. They include:

- Generation of confidence intervals for the results of the queries;
- Incorporation of the data covering up to ten additional responses as generated from the Additional Task Components of Collecting Additional Data from Existing RASS Study Respondents (across geographies, climate zone, customer class, and more)
- Availability of additional elements as options to characterize and filter households by user interests query contingent on budget availability.

The Study Team will approve the Draft and Final version of the Web Tool Advanced Features, the Draft and Final version of user's guide and training deck with additions for advanced features, the staging version of Web Tool for stakeholder review, and the final version of the published version of Web Tool with Advanced Features.

Task 7: Final Report and Presentation

The EUS Final Report (Final Report) will summarize:

- The study methodology;
- The caveats and limitations for its use;
- Key findings including estimates of typical end uses commonly associated with essential uses of electricity in kWh, with comparisons to currently-established baseline quantities in hot, warm, and cool climate areas;
- How the data can support investigation of the essential use of electricity;
- A summary of the study's outcomes, including relevant trends.

DNV will produce an EUS Draft Report for stakeholders' review and comment period of a minimum of 15 Business Days. Key deliverables under this Task include a draft version of the report, reply comments, a draft and final version of the presentation deck, a final report, and a final presentation to stakeholders. Wilkins (SCE) then reminded attendees of the EUS Budget and Timeline, including desired stakeholder engagement timelines, listed below:

Overview of the Approved EUS Budget

Study Option	Cost Estimate
Base Deliverable	$490,714
Interviews of RASS Study Respondents to Gain an Understanding of Underutilization of Electricity (75 interviews completed)	$85,524
Collecting Additional Data from existing RASS Study Respondents with up to 10 additional responses (estimated 1,000 surveys completed)	$108,575
Added Functionality to Web Tool	$120,000

Overarching EUS Timeline

Activity	Approximate Timeline
Study Initiation and Contracting	November 2020 – May 2021
Joint Study Execution	June 2021 – January 2022
Preparation of Draft Report and Web Tool	February – April 2022
Public Workshop on How to use the Web Tool	May 2022
Public Opening Comments on Draft Report	May 2022
Public Reply Comments	June 2022
Completion of Final Report and Submittal of Tier 2 Advice Letter	
Approval of Advice Letter	

Desired Stakeholder Engagement

Month	Key Topics	Possible Engagement
Jul-21	Project Initiation Review Draft Work Plan Review Draft Interview Guide (n=75) Review Prioritization of Functionality of Web Tool	High
Aug-21	Review Modelling and Analysis Plan Review Web Tool Functionality Plan	High
Sep-21	Presentation of Interview Results Review Questionnaire (est. n=1,000) Review Planned Parameters of Essential Use	Medium/High
Oct-21	Check-in Meeting, Project Status Reporting	TBD
Nov-21	Check-in Meeting, Project Status Reporting	TBD
Dec-21	Check-in Meeting, Project Status Reporting	TBD
Jan-22	Project Midpoint Status Report, Revisit Schedule	Medium/High
Feb-22	Check-in Meeting, Project Status Reporting	TBD
Mar-22	Check-in Meeting, Project Status Reporting	TBD
Apr-22	Check-in Meeting, Project Status Reporting	TBD
May-22	Review Web Tool Review Draft Final Report	Medium/High
Jun-22	Project Close-Out	TBD

Discussion: EUS Work Plan and Timeline

The group then moved into a discussion and Q&A portion, in response to the presentation, as facilitated by Wilkins (SCE) and team.

Melissa Kasnitz at the Center for Accessible Technology (CforAT) started by asking a question about how granular the final report would be - including if a user or stakeholder would be able to say something as specific as, for example, if someone who lives in a home with poor insulation and certain old appliances will have a higher (or a specific) Essential Usage. Claire Palmgren (DNV) responded by stating that granularity is the goal, but that there are certain limitations in the data, and that the finer you 'slice and dice' across variables, the less precise the analysis will be. It will be a work in progress, based on the additional data collected in Tasks 2 and 3. Wilkins (SCE) added that the RASS does have housing vintages in their dataset, as well as vintages of the primary end uses (water heaters, heating/cooling, and refrigerators) that are incorporated into the conditional demand analysis modeling. Wilkins (SCE) and Palmgren (DNV) highlighted that the more sparse the population and sample size is, the harder it is to get tight and conclusive confidence intervals on any subset of customers. The team committed to continue to incorporate stakeholder input on the importance of certain variables, and to be transparent about limitations.

3. Draft Guide for Qualitative Interviews

Ralston (Facilitator) then shifted the conversation to the Qualitative Interview Guide and discussion, inviting the consultant team at APPRISE to present their initial work plan and draft guide.

David Carroll (APPRISE) and Daniel Bausch (APPRISE) introduced themselves as the project leads from their team working on this Qualitative Interview Guide and Process. The team has substantial experience in qualitative interviewing, and specifically in understanding low and moderate income households and program design to meet those customer segments. Carroll (APPRISE) gave an overview of their approach to the work, understanding that California has a very diverse set of communities and customer segments, and that there is a need to understand and incorporate that nuance into the interview plan, in particular across low and moderate income customers. He highlighted that the more stakeholder feedback that they receive, the better the study will be.

Bausch (APPRISE) then presented the Task 2 Work Plan, which has as its goal to complete granular, detailed interviews for a subset of households with a leading objective of better understanding underutilization within essential usage. That includes capturing in narrative form the choices households are making when they make decisions about energy consumption, in particular when it relates to underutilization. He highlighted that the most important strategy and approach their team takes is allowing the interviewee to describe their decision making and approach in their own terms, instead of having them select pre-determined answers, so that the interview team can gather nuanced information. That process also enables the APPRISE team to have the flexibility to make minor adjustments over time to allow them to gather better and more accurate information.

Their team uses a semi-structured approach to interviews, where there's a guide for an interviewer with questions, details on how and where to push for follow-up, and more. Another goal is to start to present and familiarize interviewees with the questions and topics that will be asked about later in Task 3, the quantitative survey analysis. While the respondents won't be the same interviewees, their team can at least see how the questions are received and what the initial responses are, and use any feedback to inform the Task 3 questions and process. Bausch (APPRISE) also acknowledged that their goal is to understand the 'normal' pre-pandemic energy usage trends, and that their team has specific strategies to try and address that dynamic in the interview, knowing that pandemic-time use cases would be what interviewees may likely first respond with.

Bausch (APPRISE) presented out their key considerations and proposed objectives for the interviews. He further emphasized that Task 2 is focused on underutilization, with an interest specifically in medical usage, across geographies and utility territories. Their six proposed objectives were:

1. Learn how low- and moderate-income households characterize and describe their essential home electricity needs and uses.
2. Assess how essential electricity needs vary for households with different characteristics and geographic locations.
3. Understand the extent to which different essential electricity needs may not be met for target households due to underutilization.
4. Record the reasons why customers may underutilize electricity, including income level, affordability challenges, unexpected economic shocks, broken and inoperable electricity-using equipment, or housing and environmental factors.
5. Document the affected end-uses and impacts that underutilization of electricity has on the health, safety, comfort, and societal participation of target households with different characteristics and geographic locations.
6. Identify key questions of interest to include in the quantitative survey.

They also presented their key customer segments for the interviews. In-depth interviews, they highlighted, will use a small sample and will not provide measurable findings that are representative. However, including key customer segments is important to assess qualitative differences by group. The confirmed key segments they intended to include were based on:

1. Income Level (Low-income and Moderate-income)
2. CARE/FERA status
3. Geographic location
4. Varied ages and genders
5. Medical Baseline status
6. Language (both English / Spanish RASS participants)

The APPRISE team's next steps include updating the draft Interview Guide based on stakeholder feedback, selecting the interview sample from the RASS survey participant data; pretesting the Interview Guide with up to 5 customers; finalizing the Interview Guide based on pretest interview findings; contacting the sampled households to recruit and schedule interviews at times convenient for the respondent; completing a total of 75 semi-structured, 30-minute telephone interviews (or longer, as the

interview desires); distributing reward cards to the interview respondents; and summarizing and present the findings in a summary memo.

Discussion and Stakeholder Feedback

The APPRISE team then led the group into an active discussion, questioning, and feedback session related to the Qualitative Interview work plan and draft guidance.

First, Ankit Jain (CPUC) noted that it might be possible that some low-income customers, knowing that their electricity bills are likely higher in certain months than others, may adjust their electricity usage in alternate months to lower their overall bill load. For example, in advance of heat waves. Gail Slocum (PG&E) added that there are likely months when the sort of behavior that Jain (CPUC) mentioned happens seasonally, and that it's important that we are gathering information and data that reflects consumption patterns across the year - and not just what the customer is doing at the time of the interview. Carol Edwards (SCE) highlighted another nuanced scenario that is important from her perspective, which is the difference between underutilization and conservation. She reported that she has seen a lot of different approaches to keeping bills low, including age and generational differences - where certain generations are willing to conserve energy and adjust their personal habits during hot or cold months (i.e. older generations will reduce heating use but wear more layers). She highlighted that it will be helpful to get to that level of detail as well, instead of underutilization for other financial purposes.

The APPRISE team responded that they certainly factored in the likelihood of variances and differing consumption decision making in their interview process, and acknowledged that it was critical to ask interview questions that allowed them to gather that sort of complex information. Their starting point is always to start with the customer describing their own experiences, and then the team will ask hypothetical questions to get at the more nuanced details. Retallack (Pioneer Community Energy) and Kasnitz (CforAT) also emphasized the importance of ensuring language was included in the interview guide to address seasonality and other nuances that are at the core of essential usage decisions. Wilkins (SCE) and Kasnitz (CforAT) emphasized and agreed that it would be ideal and useful for there to be additional stakeholder engagement opportunities as the Draft Guide is formulated, to ask questions and inform the APPRISE team's work plan—to which they agreed.

Palmgren (DNV) reminded the group at this point that there were just under 40,000 participants in the RASS, and that with a limited 75 household sample size, there's a chance they will not end up interviewing many homes with medical equipment. DNV has requested additional information from the utilities to try to improve the likelihood of interviewing individuals in that category, including households that have reported use of specific medical equipment relevant for PSPS events, but that this is something for stakeholders to keep in mind. Kasnitz (CforAT) offered that, while not a perfect translation into medical equipment, the utilities do also have data on disability status for customers that would help inform that process.

Smith (PG&E) then asked stakeholders about geographic preference, including if there are some regions in the state with more severe climates that they could over or under sample. Kasnitz (CforAT) responded that she was unsure, and that it feels more complicated than just selecting certain climates. Oftentimes

there are also cost of living factors that impact Essential Usage in parallel to and tandem with climate zones, so it's hard to say if severe climate alone should be prioritized.

Hank Elgin (SCE) then asked for more information about how the 75 interviewees were selected. Palmgren (DNV) responded that DNV would start with the RASS data, appending that information with new overlays of customer data from the IOU's to prioritize low and moderate income, ideally medical usage, and other factors. They will also be differentiating between the qualitative interviewees, and the additional surveys that will be distributed as part of Task 3. Carroll (APPRISE) highlighted that it's important to look at outliers too, such that the team will include some high and low energy usage but not the most extreme cases, which are oftentimes particularly nuanced situations that are less representative.

4. Web Tool Levers

After a short break, Palgren (DNV) then helped the group switch gears to discuss the Web Tool capabilities and work plan. She reminded attendees of the November Meet and Confer, where the group discussed a whole suite of potential variables, and developed some consent on priority variables. The DNV team is currently working on assembling a requirements document, which will become a plan for what functionality will definitely be available in the web tool. They anticipate presenting the planned functionality at the next Stakeholder Meeting on August 6th. Palmgren (DNV) reiterated that the Base Deliverable will include several primary functionality components to provide the user the ability to:

- Select the end uses to include in the calculation of usage
- Filter on characteristics of households in dataset to include or exclude from the query
- Choose the variables to group the results (the "by" variable(s) in the crosstabulation)
- Produce cross tabulations of results including sample sizes, populations represented and mean estimates of usage

Additional Web Tool levers will include an ability to select the end uses to include in the calculation of usage, and an overview of the 2019 RASS annual energy consumption estimates for 28 end uses and the energy usage across these end uses. Users of the web tool will then be able to select from the list of end uses, to generate an estimated essential usage for a household. Those end uses include:

Primary Conventional Space Heating	First Refrigerator	Home Office Equipment
Primary Heat Pump Space Heating	Additional Refrigerator	Personal Computer
Auxiliary Space Heating	Freezer	Television
Furnace Fan	Range/Oven	Outdoor Lighting
Attic Fan	Microwave	Electric Vehicle
Central Air Conditioning	Dishwasher	Pool Pump
Room Air Conditioning	Dryer	Spa
Evaporative Cooling	Clothes Washer	Spa Electric Heat
Water Heating	Well Pump	Solar Water Heating
Miscellaneous (includes all electric end uses not specified in other categories)		

Palmgren (DNV) presented a sample preview, which is not the same presentation as the eventual Web Tool but is pulled from the 2019 RASS Web Tool, as an example of what a filter might look like. Below is both the sample filter page from the 2019 tool, as well as an example set of results including sample sizes, populations represented and mean estimates of usage:

Select Filters	
Geographic Characteristics	
Electric Utility	☐ LADWP ☐ PG&E ☐ SCE ☐ SDG&E ☐ SMUD
Gas Utility	☐ PG&E ☐ SDG&E ☐ So Cal Gas ☐ Other
2016 CEC Forecast Climate Zone	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 16 ☐ 17
Title 24 Climate Zones	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ 13 ☐ 14 ☐ 15 ☐ 16
Building Characteristics	
Individually/Master Metered	☐ Individually Metered ☐ Master Metered
Building Type	☐ Single Family ☐ Townhouse, Duplex, Row House ☐ Apt Condo 2-4 Units ☐ Apt Condo 5+ Units ☐ Mobile Home ☐ Other
Building Age	☐ Before 1975 ☐ 1975-1978 ☐ 1979-1983 ☐ 1984-1991 ☐ 1992-1999 ☐ 2000-2005 ☐ 2006-2012 ☐ 2013-2019
Square Footage	☐ Less than 500 ☐ 500-750 ☐ 751-1000 ☐ 1001-1250 ☐ 1251-1500 ☐ 1501-2000 ☐ 2001-2500 ☐ 2501-3000 ☐ More than 3000
Primary Heat Fuel	☐ Natural Gas ☐ Electric ☐ Propane ☐ Other
Type of Air Conditioning	☐ CAC Only ☐ Central Evap Only ☐ RAC Only ☐ Multiple AC Systems ☐ No AC
DHW Fuel	☐ Natural Gas ☐ Electric ☐ Propane ☐ Solar ☐ Other
Household Characteristics	
Own/Rent	☐ Own ☐ Rent
Residency	☐ Full Year Resident ☐ Partial Year Resident
Number of Residents	☐ One ☐ Two ☐ Three ☐ Four ☐ Five or More
Presence of Seniors/Children	☐ Have Children, No Seniors ☐ No Seniors, No Children ☐ Have Seniors, No Children ☐ Seniors and Children
Level of Education	☐ Less than HS ☐ HS Grad ☐ Some College ☐ College Graduate ☐ Postgraduate
Primary Language	☐ English ☐ Spanish ☐ Asian ☐ Other
Income	☐ Less than $25K ☐ $25K-49K ☐ $50K-74K ☐ $75K-99K ☐ $100K-149K ☐ $150K-199K ☐ Over $200K

Figure: 2019 RASS Web Tool Filter

Report Year: 2019
Report View: Building Type, Electric Utility
Survey Section: Administrative
Survey Question: Normalized Annual Consumption - kWh - Individualy Metered
Report Detail: Weighted, Include No Response, Include Not-Applicable
Filtered By: None

The query returns 39,985 records, representing 11,449,968 Population.
*** Results represent a sample of fewer than 25 households.**

Survey Question: **Normalized Annual Consumption - kWh - Individualy Metered**

Building Type	Electric Utility	MEAN
Single Family	LADWP	7,298
	PG&E	7,151
	SCE	7,274
	SDG&E	6,098
	SMUD	9,827
Townhouse, Duplex, Row House	LADWP	4,670
	PG&E	4,980
	SCE	5,952
	SDG&E	4,510
	SMUD	6,302
Apt Condo 2-4 Units	LADWP	3,540
	PG&E	3,834
	SCE	4,110
	SDG&E	3,815
	SMUD	4,930

Figure: 2019 RASS Web Tool Example Partial Cross-Tabulation Result

Palmgren (DNV) then walked the group through the additional enhancements included in the Added Functionality, as well as the Variables planned to be included in the Web Tool from the 'Must Have' and 'Like to Have' list from the November Meet and Confer that the DNV team is working on including.

Base Added Functionality

- Generation of confidence intervals for the results of the queries
- Incorporation of the data covering up to 10 additional responses as generated from the Additional Task Components of Collecting Additional Data from Existing RASS Study Respondents
- Availability of additional elements as options to filter households included in query
- Contingent on budget available, additional functionality and display of results

Variables Included as Enhancements in the Web Tool, Identified as "Must-Have

Category	Variables	Value Categories
Geographic	Electric Utility Territory	PG&E, SCE, SDG&E
Building Feature	Rooftop Solar	No, Yes
Other segments	On NEM Rate	No, Yes

	On EV Rate	No, Yes
	On Medical Baseline	No, Yes
	Participation in a Rate Assistance Program	CARE participant, FERA participant, not participating in CARE or FERA
	Medical Usage	No, Yes
Modeling Adjustment	Margin Error for Estimate	Calculated for specific results

Potential Variables to be included as Enhancements in the Web Tool, Semi-Consensus

Category	Variables	Value Categories
Geographic	Zip Code or County	Zip at the 3-digit level, dependent on sample sizes, County, or Both
Building Feature	Detached/Shared Wall/Apartment/Mobile	EUS category {RASS Building Type)
		Single Family detached, Shared Wall (Townhouse, Duplex, Row House), Apartment (Apt Condo 2-4 Units, Apt Condo 5+ Units) Mobile Homes, Other
Resident Characteristic	Ethnicity Head of Household	American Indian AK Native, Asian Pacific Islander, Black African America, Hispanic Latino, White Caucasian, Other
	Type of EV	Electric Plug-in, Gasoline-Electric Hybrid Plug-in
Modeling Adjustment	Appliance Age	Age categories vary by appliance and are available for: Primary Heating system, Central Cooling system, Room AC units, Primary Water Heating system, Clothes Washer, Clothes Dryer, Dishwasher, Refrigerators, Freezers, Range/Oven, Microwave.
	Appliance Specific Type	Specific type categories are available for: Electric Space Heating, Central Cooling, Water Heating system, Clothes washer, Refrigerator, Freezer

Potential Variables to be included as Enhancements in the Web Tool, "Like to Have"

Category	Variables	Value Categories
Geographic	Title 24 Building Climate Zones	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
Building Feature	Service Type	Dual, Electric
Resident Characteristic	Estimated Household Income	Less than $25K, $25K-49K, $50K-74K, $75K-99K, $100K-149K, $150K-199K, Over $200K

Modeling Adjustment	Fixed adjustment factor for each end use	TBD – identify what end uses this is available for and the appropriate factors
Resident Characteristic	Vacation Home	No, Yes
Modeling Adjustment	Appliance Use Intensity	TBD – identify what end uses this is available for and the appropriate adjustments
Building Feature	Windowpane Type	All or most single pane, All or most double pane, All or most triple pane, Mixture of single, double and/or triple pane
	Cooling Type	Central AC only, Central Evaporative only, Heat Pump only, Room Air Conditioners only, Multiple types of systems, No Cooling/AC
Resident Characteristic	Permanently Disabled Resident	No, Yes – 1, Yes – 2 or more
	Owner/Renter	Rent, Own
Building Feature	Residence Type	Single-Family, Multifamily

Sample Content of Output of EUS Web Tool

USER SPECIFICATIONS						
USER SELECTIONS	**VARIABLES**					
End Uses to be Included in Essential Use Estimate	Primary Conventional Space Heating Central Air Conditioning Water Heating Dryer Clothes Washer Dishwasher First Refrigerator Range/Oven Television Microwave Home Office Equipment Personal Computer Miscellaneous (includes all electric end uses not included in the other available specific categories)					
Segment	Seasonal Usage: **Summer**					
Filters applied	Residence Type: **Single-Family Detached** Rate Assistance Program Participant: **Yes**					
RESULTS						
Dwelling Built Year	**Essential Use Annual Consumption (Mean)**	**Standard Error of Essential Use Mean**	**Normalized Annual Total Consumption (Mean)**	**Standard Error of NAC Mean**	**Sample Size**	**Population Represented**
Overall Total	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
Prior to1975	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
1975-1978	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
1979-1983	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
1984-1991	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
1992-1999	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
2000-2005	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
2006-2012	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N
After 2012	kWh	+/- kWh	kWh	+/- kWh	Actual n	Projected N

Palmgren (DNV) highlights that, in the sample output above, the display will certainly be different. It is a useful demonstration, though, of some of the specifications that the user is able to choose from, with results demonstrated in some crosstabulation with the mean, standard error, normalized annual total consumption, and more. She highlighted that, if all variables were included and able to be cross-tabulated, the sample sizes would be very small and the output would run into challenges in becoming representative and meaningful. The DNV team is working on how to incorporate as many of these variables as they can while making sure the results are robust enough.

Discussion and Feedback: Web Tool

Ralston (Facilitator) and Palmgren (DNV) then opened up the discussion for feedback and questions from stakeholders. Kasnitz (CforAT) started by highlighting the importance of medical devices being included in the initial levers, and not getting lost into a Miscellaneous category. Palmgren (DNV) responded that she agreed on the importance, and that at the August meeting they plan to also discuss the modeling and analysis plan in further detail. During that discussion, the presenters will be able to go into more detail on the extent to which they'll be able to look at medical devices as a separate end use in the modelling,

based on total sample sizes. But she agreed the goal is to prioritize this customer segment. She highlighted that users will certainly be able to filter for energy usage information for those with medical devices, but it may be much harder to model usage based on specific types of medical devices.

Kasnitz (CforAT) also asked if 'head of household' was an archaic language term to use, and if the team could use a different term that alludes specifically to the person responsible for electric bills. Palmgren (DNV) said they would certainly look into that, though head of household is what is used in RASS.

Jain (CPUC) asked about what the baseline territory is, and if it includes specific climates as well as utility service territories. Palgmren (DNV) mentioned that they already have T24 climate zones embedded in the data, and could incorporate those into the baseline territories. Elgin (SCE) agreed about the importance of this added designation, even if it's a climate sub-category above T24 climate zones if the sample size is too small.

Elgin (SCE) then asked if the data pulled was based on average consumption per household, such that the usage for any individual appliance was calculated as an average, or if there was an ability to see energy usage of each individual appliance. He emphasized the importance of being able to extrapolate per appliance and per unit consumption. Palmgren (DNV) responded that they do have it split out per appliance and end use for major appliances, such as refrigerators. Some of the other end uses ,though, would be net across a unit - such as TV's and Room AC. They do know the number of units for each of those per household, though, and would be able to get average per appliance.

Bridget Sieren-Smith (CPUC) asked if there was a way to query based on if a household is all-electric or dual-fuel household. She highlighted that this is a critically important variable for her use, for some work in the Affordability Order Instituting Rulemaking (OIR), looking at both all-electric and dual-fuel bills. Palmgren (DNV) mentioned that this was on the Like to Have list (Building Type - Service Type - Dual Fuel, Electric) but that they could consider adding that to the Must Have list, to re-prioritize. Edward (SCE) mentioned that, through her work with the San Joaquin Valley proceeding, she knew this would also be a very important variable to include. She mentioned that electric water heating would probably be the best proxy for an all-electric household, but that differentiating between all-electric and those that have any gas hookup or appliances is very important as utilities and jurisdictions start to decide whether to maintain, extend, and/or decommission any gas lines as customers electrify. She agreed that pulling out all-electric households specifically is really important to evaluate bill impacts and infrastructure decisions. Elgin (SCE) and Ankit (CPUC) agreed with this, with Ankit (CPUC) highlighting that baseline quantities for dual-fuel and all-electric customers are significantly different from one another, such that understanding customer usage by customer fuel type would be a very useful outcome from this study, and that PUC code only requires customers to have electric space heating to be on an all-electric rate, so estimating all-electric customer usage via filtering by specific end-uses is only a rough approximation of this customer type. Palmgren (DNV) mentioned that the RASS does collect this information.

Slocum (PG&E) provided some general feedback on prioritization, including that, if and when variables need to be prioritized over each other, one additional filter could be the variables that are the most actionable against the utilities' billing systems. She highlighted that, in the end, there will have to be a proceeding to decide how to use the data, and that the billing system doesn't currently differentiate based on specific appliances - as something to keep in mind.

After the meeting, a few participants sent emails to the Study Team with additional comments. Eileen Hlavka (CPUC) highlighted the important opportunity for the EUS to include time of use considerations - specifically, if possible, to capture information on customers' willingness and ability to shift when they use energy. She highlighted that this would be helpful information to determine potential policy action and bill implications, and that time of use has major implications for the source of energy, and thus for what generation sources are needed to serve it, and thus for GHG impacts and cost. Sieren-Smith (CPUC) also added an opinion that Estimated Household Income should be moved from "like to have" to "must have." She emphasized that doing so would enable analysis of the diversity of consumption across income classes, and could facilitate calculating energy burden (electric energy burden, gas energy burden) as a proxy for a metric in the Affordability OIR to measure affordability, the Affordability Ratio.

5. Wrap-up

Ralston (Facilitator) quickly summarized the takeaways from today's meeting. The group covered the EUS Project Timeline, including where we're at, where we're going, key dependencies, and opportunities for stakeholder input throughout process; the Draft Qualitative Interview Guide and the objectives and priorities, what's included, and the process for finalizing and beginning interviews; and the Preview of the EUS Web Tool, including how the prioritization exercise is being reflected in tool development, levers identified and what they could look like, and other enhancements.

She then walked through what the group can expect next - including, following this meeting, that the Draft Guide on Qualitative Interviews will be sent out within a few days for review, with an opportunities to dive deeper and review on a call Friday, July 30th from 2-3:00 PT, and that they will be asking for comments and feedback quickly after the July 30th call. She then covered what to expect at the meeting on August 6th from 10-12:30 PT, which will include an IOU Presentation of Modeling and Analysis Plan, further discussion on the Web Tool Levers and Functionality Plan, and additional Discussion, Questions, and Input.

Ralston noted that the facilitation team would be writing up notes for the IOU team before the end of the following week, which would be distributed as a Final Report to the relevant stakeholders and listservs. DNV-GL and PG&E noted there would be additional public comment opportunities in the implementation period itself, and that they encouraged all stakeholders to reach out at any point with written feedback or questions to the key study contacts.

Additional questions and comments were invited to be sent to Michelle Vigen Ralston at michelle@common-spark.com for inclusion in the Meet and Confer notes. Key study contacts at the electric IOU's included Brian Smith from PG&E at b2sg@pge.com, Hank Elgin from SCE at hank.elgin@sce.com, and J.C. Martin from SDG&E at JCMartin@sdge.com. For DNV-GL, the lead contacts are Claire Palmgren at Claire.palmgren@dnvgl.com and Paula Ham-Su at paula.ham-su@dnvgl.com.

Stakeholder Meet & Confer: Essential Energy Use Study

Meeting Notes | Submitted Friday, August 13, 2021
Friday, August 6, 2021 from 10:30am-12:30pm PT
Online Meet and Confer
Hosted by: Pacific Gas and Electric Company
Facilitated by: Michelle Vigen Ralston, Common Spark Consulting

This document contains three sections:

1. Attendees
2. Upcoming Meetings
3. Meeting Notes

1. Attendees

Those in attendance are listed below. Other representatives from the organizations below may have also been in attendance and may be inadvertently left off this list if they did not speak during the meeting.

Name	Organization
Melissa Kasnitz	Center for Accessible Technology
Christopher Hogan	CPUC - Public Advocates Office
Alan Siebuhr	CPUC - Public Advocates Office
Jason Symonds	CPUC - Energy Division
Bridget Sieren-Smith	CPUC - Energy Division
Peng Gong	CPUC - Energy Division
Ali Choukeir	CPUC - Energy Division
Paula Ham-Su	DNV
Miriam Goldberg	DNV
Claire Palmgren	DNV
Jonathan Taffel	DNV
Craig Williamson	DNV
Timothy Henessey	DNV
Brian Arthur Smith	Pacific Gas and Electric Co.
Darren Roach	Pacific Gas and Electric Co.

Brittany Malowney	San Diego Gas & Electric
J.C. Martin	San Diego Gas & Electric
Hank Elgin	Southern California Edison
Cyrus Sorooshian-Tafti	Southern California Edison
Luis Gutierrez	Southern California Edison
Prapti Gautam	Southern California Edison
Reginald Wilkins	Southern California Edison
Carol Edwards	Southern California Edison
Dan Bausch	APPRISE
Brian Theaker	NRG Energy
Doug Karpa	Peninsula Clean Energy
Jennifer Dowdell	TURN

Consultant Team: Michelle Vigen Ralston, Katie Wu, and Suhaila Sikand - Common Spark Consulting

2. Upcoming Meetings

- The Study team (IOUs and DNV/APPRISE) is committed to providing monthly stakeholder engagement.
- September: Stakeholders will be invited to a Friday afternoon (date TBA) status update meeting.
- The next Public Project Meeting for the EUS will be on **October 19 at 12:30-3:00pm PT.**

3. Meeting Notes

Introduction and Background: Essential Energy Use Study

At the outset of the meeting, Michelle Vigen Ralston of Common Spark Consulting welcomed and introduced participants. Brian Smith of Pacific Gas and Electric Co. (PG&E) started the meeting with a safety check, reminding folks of necessary safety measures for earthquake preparedness. He highlighted creating an Emergency Kit, identifying an Out of Area Contact, and reviewed the reliability of landlines and email in limited cell service areas.

After the safety check, Ralston (Facilitator) walked participants through the meeting agenda and objectives, noting that the goal of the meeting was to provide updates on Analysis and Modeling Planning, Draft Guide for Qualitative Interviews, and Energy Usage Study (EUS) Web Tool functionality.

Recap of Engagements

Ralston (Facilitator) then briefly discussed previous engagements, specifically what had been discussed since the last Meet and Confer on July 20, 2021. She reminded participants of the EUS Timeline—emphasizing the impact and ripple effects of the EUS project—reviewed the presentation of the Draft

Qualitative Interview Guide on July 30, 2021 and revisited how stakeholders prioritized and identified key functionalities in the EUS Web Tool. Ralston ended this section asking participants if they had questions or comments; no participant spoke at this time.

Presentation of Modeling and Analysis Plan

Claire Palmgren of DNV began a presentation regarding the Modeling and Analysis Plan. She kicked this presentation off with an announcement of the release of the final 2019 California Residential Appliance Saturation Study (RASS) report on the California Energy Commission (CEC) website and the DNV access to the tool. Palmgren (DNV) noted that the data tables of the 2019 RASS are available for download.

Background on California Residential Appliance Saturation Study (RASS)

Palmgren (DNV) then elaborated with a background on the RASS studies, indicating that the 2019 RASS study builds off two previous studies, the 2003 and 2009 RASS studies that was comprised of self-reported data in all major utility zones with consumption habits and building characterizations. Palmgren noted that the 2019 RASS study had the most participants, about 40,000 residential customers.

Using RASS Data

Palmgren (DNV) noted that the EUS will leverage the RASS data for the study. Throughout the meeting, this distinction was clarified and elaborated upon. For clarity, Common Spark Consulting and DNV summarized the distinction below:

The 2019 RASS data is one of the main streams of data that will be used in the EUS. The EUS goal is to estimate the electricity usage of households by use categories. Due to the 2019 RASS data timeframe, October 2018-October 2019, the EUS will match for consistency. DNV acknowledges that the 2019 RASS reflects pre-COVID consumption behaviors. The EUS will build on the 2019 RASS data (only RASS data within the PG&E, SDG&E, and SCE territories will be included in the EUS) with a batch of Qualitative Interviews to be conducted this fall and a follow-up Quantitative Survey to selected 2019 RASS participants. These additional data streams will help expand the data initially gathered in the 2019 RASS. Through the Modeling and Analysis Phase, the DNV team will conduct additional modeling to fill in data gaps. Further, the EUS Web Tool will use the modeled data to present a way for online users and stakeholders to filter the data through numerous streams including, but not limited to, number of residents in a household, fuel type, appliance, utility territory, and medical equipment usage, for the purposes of better understanding and arguing for what ought to be included in the definition of essential energy use.

2019 RASS data was collected and analyzed with two additional methodologies: a Weather Normalization and Conditional Demand Analysis. To help participants understand what the 2019 RASS data shows, the DNV team walked participants through each.

Weather Normalization Overview

Tim Hennessey (DNV) picked up the presentation with an overview of the Weather Normalization data analysis. Hennessey began by identifying the ways in which weather affects energy consumption behaviors. To evaluate energy usage, these extreme influences needed to be normalized to avoid skewing data. Through mathematical modeling against baseline temperatures, the data shows normalized annual consumption by usage categories and the temperatures at which households begin heating or cooling homes.

Conditional Demand Analysis (CDA) Overview

Craig Williamson (DNV) continued the presentation by discussing the way the 2019 RASS study broke down total energy use into individual end uses. The CDA uses a statistical regression model with normalized consumption data to divide the consumption into the parts of the house. The 2019 RASS study included 28 electric end uses. Limiting factors of the CDA include:

- Difficulty estimating near saturation, which occurs when everyone has a given appliance, like lights or a fridge.
- Difficulty separating groups of end uses, known as collinearity
- Influence by behavior, for example, teenagers may use more hot water when showering than other household residents
- Difficulty disaggregating small consumption appliance use (like printers or toasters)

Many questions and discussion followed this presentation, including a deep dive into medical equipment. Concern was surfaced on whether the EUS Web Tool would display disaggregated use from medical devices and whether EUS Web Tool users would be able to filter by the presence of a medical device in a given household. It was noted that the 2019 RASS Study merely included whether households had medical devices, but the usage was folded into the Miscellaneous End Use category and that the there was no distinction of the kind of medical device in use. DNV specialists discussed that while a full degree of disaggregation is desired and intended, the EUS Web Tool will likely not be able to distinguish the kind of medical device. However, the DNV team noted their intention to gather more data from IOUs and other sources to pull out Medical Devices as its own end use that could be filtered in the EUS Web Tool (this, however, cannot be guaranteed without looking at the data requested). Typical statistical limitations would also apply.

Update: Draft Guide for Qualitative Interviews

After a short stretch break, Ralston (Facilitator) brought back the participants. Palmgren (DNV) provided a quick update on the Draft Guide for Qualitative Interviews. Palmgren summarized that the APPRISE team presented a deep dive on the topic on Friday, July 30, 2021. The draft presented included general probes and questions. She noted that the session was informative with feedback from IOUs and stakeholders. Additional feedback was requested by end-of-day August 6, 2021. Moving forward, Palmgren and the APPRISE team plan to make revisions and review all feedback within the next week. They anticipate pre-testing questions in mid-August, modifying the guide as needed. They plan to conduct interviews in

September and presenting the results in an October stakeholder meeting. For a full breakdown of the timeline, see the table below:

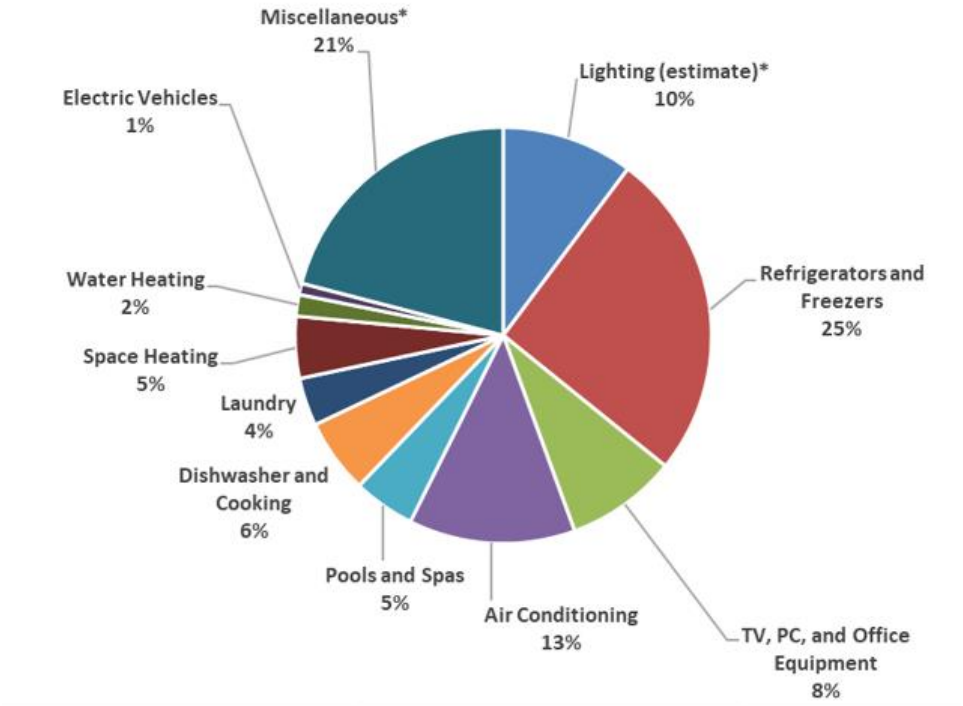
Activity	Approximate Timeline
Study Initiation and Contracting	November 2020 – May 2021
Task 2: Qualitative Interviews (n=75)	August – September 2021
Present Interview Results	October 2021
Task 3: Additional Survey Questions (est. n=1,000)	November – December 2021
Task 4: Modeling and Analysis	September – January 2022
Mid-point status, Review Schedule	January 2022
Preparation of Draft Report and Web Tool	February – April 2022
Public Workshop on How to use the Web Tool	May 2022
Public Opening Comments on Draft Report	May 2022
Public Reply Comments	June 2022
Completion of Final Report and Submittal of Tier 2 Advice Letter	
Approval of Advice Letter	

Update: Web Tool Functionality

Palmgren (DNV) moved directly from the previous presentation into an update on the EUS Web Tool and its functionality. For clarity, Palmgren again described the difference between the 2019 RASS and the EUS Web Tool, identifying that the 2019 RASS was contracted by the CEC and included a Weather Normalization review and a Conditional Demand Analysis. She also responded to questions regarding the 2019 RASS leveraging unit energy consumption (UEC) combined with advanced metering infrastructure (AMI) interval data. The 2019 RASS data is the foundation of the EUS, but the EUS will also include additional data streams including qualitative data on underutilization and surveys focused on medical equipment usage, and its own analysis for the purposes of understanding essential energy use.

For clarification, Common Spark Consulting notes here that unlike the EUS's focus on identifying essential energy uses, the RASS is focused on understanding saturation rates of certain types of appliances and their associated energy consumption. This information is often the basis for determining assumed baseline energy consumption for programs such as energy efficiency.

Palmgren (DNV) continued, showing a pie chart (see below) from the 2019 RASS that displays the combination of estimated energy consumption and estimations per category and statewide. These categories are combinations of the 28 electric end uses.



2019 RASS: 6,174 kWh per home

A few questions surfaced about this data. One participant asked if the data is broken down by IOU territory. The 2019 RASS is broken down by utilities: PG&E, SCE, SDG&E, LADWP, and SMUD. However, the EUS will only use data from the PG&E, SCE, and SDG&E territories. A second question asked about the high consumption of certain end uses like Water Heating and how that only accounts for 2% of the usage and whether the pie chart above is reflective of statewide energy use or household energy use. The DNV team clarified this was statewide energy use, and that because only some households have these appliances, the energy consumption averaged out across the state. Although households with water heating would consume a majority of that household's consumption, not all households across the state have that end use. Another question asked about the AMI interval data and compliance with personal identifying information requirements. Palmgren (DNV) clarified that DNV is not collecting new AMI data, simply leveraging from the 2019 RASS with the Weather Normalization and CDA for the EUS study. When AMI data is used for the RASS, it is anonymized per policies to protect personal identifying information.

Palmgren (DNV) continued, describing that the data from the 2019 RASS will be used in the EUS Web Tool to allow web users to filter the data based on the characteristics desired, including the 28 electric end uses and anticipated additional features like building characteristics, number of residents in a household, and medical devices.

Palmgren displayed a few examples from the 2019 RASS to demonstrate the functionality of the anticipated EUS Web Tool. The examples break down some key clarifications including:

- the more a user filters, the less data is sampled

- not every participant in the 2019 RASS survey answered every question, so there are sample size differences

The EUS will leverage the CDA models from 2019 RASS so that Web Tool users may quantify household energy usage for building types with different characteristics distinguished through filters. With this approach, filters can be combined with other filters, and hopefully will maintain enough underlying data to support the combined-filter search. The data will be pooled in a way to ensure that outputs accurately reflect real life electricity use by end use category. One question was raised during this section about whether interpolation or estimations would be leveraged in small sample size searches. Williamson (DNV) responded saying that a hybrid of actual customer data and the adjustments just described would be used. For example, the team might estimate common searches that would normally provide small sample sizes by looking at the trajectory of data for certain, highly searched scenarios. Palmgren (DNV) continued presenting various examples noting that most of the internal discussion is centered around the approach of how to use adjustment factors to address the queries users would desire.

Discussion

Ralson (Facilitator) recentered the conversation after the presentation to address again the medical baseline and medical device inquiries of stakeholders. Ralston asked, that if all the statistics requirements were satisfied, where would a web user see medical device filtering in this EUS Web Tool? Palmgren (DNV) responded that the 2019 RASS data doesn't have a proper filter for the data, but with imagination, you could see how the EUS Web Tool would incorporate it.

Ralston (Facilitator) set up another question, asking about the role of qualitative interviews and how they will support and compliment EUS Web Tool. Palmgren (DNV) addressed this question by stating that the qualitative interviews are focused on underutilization and the decisions behind consumer energy consumption choices. She continued with an example that if a web user wants information on lower income households, then the qualitative data can be used as supplemental data from the final EUS Report. Carol Edwards (SCE) and Melissa Kasnitz (Center for Accessible Technology) elaborated individually on this topic of qualitative data. They wondered if the qualitative interviews would ask questions about the choices made by consumers, specifically if the EUS Web Tool would take that into account. The DNV team noted that the qualitative interviews would be used in the EUS Report (a document that should be used in conjunction with the EUS Web Tool) but would likely not impact the EUS Web Tool itself. Edwards (SCE) distinguished that asking *how you cool your house* is a very different question than *which cooling system do you use*. Kasnitz (Center for Accessible Technology) added that the way questions are framed around underutilization, in particular avoiding it, would help juggle customer necessities. DNV noted that the question could likely be incorporated into the Qualitative Interview Guide.

Peng Gong (CPUC) asked about the level of interval data with the AMI and personal identification indicators. The team confirmed the data was electric usage, gathered in 15-minute intervals, and anonymized with personal identification protected. Williamson (DNV) noted that weather normalization data was conducted daily.

Wrap-up

Ralston (Facilitator) quickly summarized the takeaways from the meeting. The group heard updates from the Modeling and Analysis Plan, a brief update on the Draft Guide for Qualitative Interviews and walked through an update on the EUS Web Tool functionality.

She then walked through what the group can expect next. Ralston (Facilitator) noted that the September meeting would be shorter due to anticipated ongoing qualitative interviews, and would be held on a Friday afternoon (date TBA). She then invited participants to help identify a date for the October Meet and Confer, in which the group settled on October 19 from 12:30 – 3pm.

Additional questions and comments were invited to be sent to Michelle Vigen Ralston at michelle@common-spark.com for inclusion in the Meet and Confer notes. Ralston thanked everyone for participating in the Meet and Confer. Smith (PG&E) closed with a note about excitement for ongoing engagement.

Meet & Confer: Essential Energy Use Study

Final Stakeholder Meeting Meeting Notes

Meeting held: Friday, December 9, 2022 from 9:30am-12:00pm PT
Meeting Notes submitted: Friday, December 30, 2022

Online Meet and Confer
Hosted by: Pacific Gas and Electric Company (PG&E)
Facilitated by: Michelle Vigen Ralston & Suhaila Sikand, Common Spark Consulting

This document contains two sections:

1. Attendees
2. Meeting Notes

Attendees

Those in attendance are listed below. Other representatives from the organizations below may have also been in attendance and may be inadvertently left off this list if they did not speak during the meeting.

Name	Organization
Daniel Bausch	APPRISE
Adam Barsch	CalAdvocates
Chris Hogan	CalAdvocates
Melissa Kasnitz	Center for Accessible Technology
Tad Gondai	Community Legal Services
Ankit Jain	CPUC
Bridget Sieren-Smith	CPUC
Otto Nichols	CPUC
Benjamin Kiner	DNV
Claire Palmgren	DNV
Nathan Caron	DNV

Nelson Chui	DNV
Paula Ham-Su	DNV
Tyler Mahone	DNV
Bob Ramirez	Opinion Dynamics
Brian Arthur Smith	PG&E
Reginald Walkins	SCE
Jordi Lopez	SDG&E

Meeting Notes

Introduction

Suhaila Sikand, Common Spark Consulting, welcomed participants to the final stakeholder meeting. Sikand reviewed the meeting objectives:

- Reflect on the stakeholder process and how stakeholder input guided updates on the project;
- Seek input if the study achieved its goals; and
- Present the Web Tool and anticipated Final Report.

Sikand reviewed the agenda, asked participants to introduce themselves in the chat, and introduced Brian Arthur Smith of PG&E. Smith began with a safety reminder as well as other general reminders.

Essential Energy Usage Study Retrospective

Michelle Vigen Ralston, Common Spark Consulting, introduced the Essential Energy Usage Study (EUS) project by describing D.18-08-013 Ordering Paragraph 14, which directed PG&E to develop a model of what constitutes essential residential energy usage. Ralston noted subsequent decisions from the California Public Utilities Commission (CPUC), directing both San Diego Gas and Electric (SDG&E) as well as Southern California Edison (SCE) to join with PG&E to complete this modeling. PG&E, SDG&E, and SCE are collectively referred to as "Joint Utilities" for the remainder of this document.

The phrase “Essential Energy” does not appear in the Baseline statute enacted by the legislature (PU Code Section 739(a)-(d)), but the statute sets the parameters for Commission adoption of baseline quantities as having to fall within a defined

percentage range it finds to be "*necessary to supply a significant portion of the reasonable energy needs of the average residential customer.*"

Ralston summarized the primary objective of the project: to develop a model of what constitutes essential use for residential customers and information to support. She noted that the results of the Study will contribute to efforts to:

- determine whether residential customers are meeting their basic electricity needs at a reasonable cost,
- designate a baseline quantity of gas and electricity that is necessary to supply a significant portion of the reasonable needs of the average residential customer, and
- evaluate what electricity usage is essential for differently situated customers throughout California.

Ralston dissected each task ordered (see list below) and those pursued by the Joint Utilities, with special focus on the Task 2 (Qualitative Interviews) and Task 6 (Web Tool) dashboard, noting these as key areas where stakeholders guided and informed the final product. The tasks include:

- **Task 1: Project Management and Stakeholder Coordination:** approval of study Work Plan and regular meetings
- **Task 2: Qualitative Interviews:** conduct a minimum of 75 interviews to 2019 RASS survey respondents across varying demographics
- **Task 3: Additional Data Collection:** follow-up with 2019 RASS respondents, including those on or near medical baseline eligibility, to complete a separate questionnaire with an additional 10 questions
- **Task 4: Modeling and Quantitative Analysis:** model usage for various end uses using consistent methodologies
- **Task 5: Base Web Tool (Dashboard):** create an enhanced Web Tool to allow users to interact with datasets and estimate usage for various scenarios
- **Task 6: Added Functionality for the Web Tool:** beef up the Web Tool for additional data, confidence intervals, and filtering
- **Task 7: Final Report and Presentation:** write a report to summarize methodologies of the study and key findings

Ralston presented a timeline of events from March 2020 until this meeting that described the behind-the-scenes work of the Joint Utilities, the stakeholder engagement opportunities, and how feedback was integrated. Ralston emphasized that frequent project team meetings occurred to continue developing the work. Between March 2020 and December 2022, the Joint Utilities met with stakeholders 17 times to gather input, share updates, and hear feedback on various aspects of the project.

Ralston emphasized a few themes elevated by stakeholders throughout the engagement process, including distinguishing conservation versus underutilization, and

medical baseline customer eligibility and enrollment (or lack thereof). Ralston dissected the ways in which stakeholders informed the EUS project. Specifically, Ralston noted that:

- Stakeholder comments on the draft study helped broaden the scope of what might need to be examined or added in the EUS Plan; also specified and confirmed what deliverables would be of most value to stakeholders (Task 1).
- Stakeholders took a universe of potential Web Tool variables and through a homework and interactive prioritization exercise, identified where there was consensus on “must have” variables and “like to have” variables. These variables were then integrated into the Web Tool (Task 5 & 6).
- Stakeholders provided recommendations on the qualitative interview questions to encourage more nuanced data collection and thinking around conservation practices vs. underutilization of energy services. Recommendations also showed the value of hearing from outlier data points and expanding inquiries regarding the diversity of circumstances around medical baseline (Task 2).
- Stakeholders provided input on the survey questions related to electric usage related to medical needs (Task 3).
- Stakeholders reviewed early versions of the Web Tool and provided specific updates to address access, usability, and features to support research and advocacy (Task 5 & 6).

No participants raised questions or comments during this section.

Spotlight: EUS Web Tool

Claire Palmgren of DNV, introduced the newly updated EUS Web Tool (Task 5 & 6) and how it came to fruition. Palmgren described the functionality of the tool, noting that users can:

- Define what household electricity usage is essential;
- Explore and evaluate the estimated usage across households with varying characteristics throughout California; and
- View scenario results in a crosstabulation table.

Palmgren then dissected the Web Tool development process. Through CPUC direction, the Joint Utilities began this process in which stakeholders prioritized the "must-have" and "like-to-have" tool capabilities and parameters. To develop the Web Tool, DNV leveraged data available from the 2019 RASS survey and requested additional data from the Joint Utilities where gaps existed. DNV then conducted data modeling and analysis (Task 4) to create the desired tool characteristics and outputs. In January of 2022, DNV shared initial concepts and user scenarios for the Web Tool. Throughout its development, DNV shared wireframes, mockups, and draft demos with stakeholders.

Palmgren highlighted the final characteristics with which users can slice or filter with the Web Tool. In particular, Palmgren called out how DNV responded to stakeholders' recommendation to distinguish medical baseline customers from a large miscellaneous category and described why two "must-haves"—rooftop solar and electric vehicle (EV) rate—are not included. Rather, indicators of these two “must haves” were integrated in the form of two other characteristics: identification of Net Energy Metering customers and whether households own or lease an EV.

Palmgren proceeded to summarized the specific end uses that users can select as "essential usage," including categories of end uses (e.g., Primary Cooling) as well as individual end uses (e.g., Heat Pump Space Heating). Palmgren noted that these data points and estimates came from the 2019 RASS survey. DNV noted that the default query search (what would happen if users do not select any query options) on the Web Tool includes the first refrigerator and indoor lighting. Palmgren noted upcoming updates and reminded participants of a few critical elements, including how results are displayed.

Nelson Chui of DNV, ran through the user interface for the Web Tool. Chui provided an overview of how users can access the Web Tool (by logging in or registering), and noted that users can access and download documents (including the User Guide, presentations, and Final Report) before signing in or on the home dashboard page. Chui noted that the Design Scenario is the main query page and it includes three steps:

- Step 1: Users can select components of electric essential use
- Step 2: Users can create comparisons and specify households (this is referred to as ‘slicing’ and ‘filtering’, respectively).
    - Users can slice up to three characteristics. Chiu warned that the more users slice data, the smaller the data sample will be.
    - Users can select a subgroup of households by filtering by geographic, building, and/or household characteristics
- Step 3: Users can select the result options, including seasonal usage, cooling season thermostat settings, and/or heating season thermostat settings.

Questions on Overview of Web Tool

- Smith asked if the tool is live. Palmgren responded that it is, but it’s being referred to as the "Public Draft" version.
- Smith asked if and how the DNV team will be collecting feedback. Chui noted that at the moment, feedback should be directed to the support email (EUSsupport@dnv.com) and that there is not yet a feedback form.
- Ralston asked if there will be additional trainings on how to use the Web Tool.
    - Palmgren noted that the User Guide (to be released within a week) outlines how to run scenarios and will be the primary resource for onboarding users. DNV is looking for input where folks have questions.
- Chris Hogan, CPUC, asked for the slides to be distributed publicly.

Spotlight: Web Tool Demo

Palmgren and Chui continued with a live demo of the Web Tool. Palmgren highlighted a few notes about the Web Tool, specifically:

- The usage estimates are draft values and the confidence intervals are approximated. Palmgren noted that the final data is not yet loaded into the system.
- Sample sizes and populations will be displayed for all data rows.
- Results will not be displayed if the sample size is less than twenty-five households.
- Seasonal usage will not be depicted unless an electric utility provider is selected.
- Additional refinements to the tool may be developed in the future as feedback is provided.
- Confidence intervals are calculated on the spot, so it may take a few minutes to generate query outputs.

Chiu displayed the Web Tool homepage, and walked through the registration process as well as the relevant documents. Chiu noted that the resources are not yet linked, but will be soon.

Chiu entered the Web Tool Portal to the home dashboard with additional information, resources, and project context. Chiu entered the 'Design Scenario' tab where search queries are hosted. Chiu began with Step 1, and noted that the refresh page button is a handy reset button for form selections. Chiu demonstrated Step 2, how to slice the data. Chiu noted that a slice must be selected, and by default it is 'electric utility.' Chiu elevated that the output from queries open in a new browser tab called 'Output Report.'

Each 'Output Report' contains an 'Input Summary' with the user's query selections. Below the 'Input Summary' is a data table. Every 'slice' has its own column. Chiu called out the 'Sample Size' as a critical data point to watch and experiment with. Estimated Essential Use Consumption columns are the model outputs based upon user query selections. The Total Household Consumption columns are the actual datasets from the RASS survey and include all equipment present in homes, regardless of the user's query selections. Chiu noted that when an electric utility is selected, the data will include values for Winter and Summer essential use but will not include totals for this granularity.

Chiu ran through another scenario slicing by utility baseline territory group and medical baseline. The output table displayed two slice columns, with many rows and ~34,000 households in the sample size. Chiu ran a third scenario by adding filters to the two slices and central air cooling as essential use. This had fewer rows and a sample size of ~5,500 households (Chiu again elevated the importance of checking sample sizes of queries).

Chiu ran a fourth query slicing by building type only. Chiu noted that Winter and Summer will always be on the table, but may not have values unless 'Annual' is selected in Step 3. Palmgren noted that SDG&E defines summer as 5 months whereas PG&E and SCE define summer as 4 months. Due to the difference in number of days for each season, the usage values are not comparable for seasonal usage and thus values may not be displayed for Winter and Summer columns.

Chiu summarized a live walkthrough of three scenarios:

1. User runs the web tool using default selections.
2. User includes central air conditioning/heat pump cooling in Essential Use and slices the results by utility baseline territory group and medical baseline status.
3. User includes central air conditioning/heat pump cooling in Essential Use; slices the results by utility baseline territory group and medical baseline status; and filters on PG&E X, SCE 9 and SDG&E Inland.

Questions

- Sikand asked for the support email and emails to provide feedback. EUSsupport@dnv.com; Claire.Palmgren@dnv.com
- Sikand asked if the order of slicing changes the data depicted. Chui noted it does not change the data, but it will change where each column is displayed in the data set.
- Ankit Jain, CPUC, asked if there is a description of which climate zones are included in each climate zone group. Palmgren noted that this information is available in the User Guide, but the DNV team will think about adding it to the display so it's visible while a user is selecting in the tool itself.
- Ralston asked about the timeline for the final rollout. Palmgren elevated two updates to be implemented as part of finalizing the Web Tool: (1) upload the final dataset, which is currently under review and expected in January; and (2) add additional functionality on a rolling basis. Palmgren noted this is a Draft Web Tool with public access and feedback is desired. **DNV is requesting feedback before the holidays for full review and consideration of the project team.**
- A participant asked if there is a difference between "cooling season" and summer, and "heating season" and winter. The project team replied that the summer and winter seasons are based on calendar dates for each IOU. The thermostat settings calculate heating and cooling dates within a household. Weather normalization is based on 2019 RASS which covered Fall 2018 to September 2019. The models and weather normalization are based on the real consumption data from that study period time.

Project Context

Reggie Wilkens (SCE) summarized that **stakeholders are concerned that underutilization is happening** and this study is intended to help explain and explore that.

As depicted with the Web Tool demo, users can see what constitutes essential energy use. The study will provide a basis for the user to model the essential usage.

Wilkens emphasized that the Web Tool demonstrates how essential use is a function of the inputs chosen (e.g., medical needs, household characteristics, appliance efficiency and programming capability). Wilkens noted that a larger problem is the environmental framing of these choices and how interconnected they are to separate factors like EV adoption, state policies, and new tech.

Wilkens highlighted that stakeholder participation is the reason the study became what it is. Wilkens summarized that the meeting's presentation is one iteration of the study, and the vision is for the study and Web Tool to be ongoing resources applicable across CPUC proceedings. Wilkens suggested that perhaps future RASS will be created with this tool in mind.

Wilkens reviewed the final deliverable of the project, an EUS Study Report. Wilkens outlined that:

- Common Spark Consulting is preparing a meeting summary and a brief engagement report summarizing the input from throughout the EUS study.
- DNV is compiling a Project Report that will be under Joint Utilities' review by the end of the year. The draft report will be provided to stakeholders by January 30, 2023, with comments due by February 20, 2023. The final version of the report will be submitted in a Tier 2 Advice Letter no later than March 31, 2023.

Questions:

- Melissa Kasnitz, CforAT, questioned whether the CPUC will respond directly to the Advice Letter (for example, with a resolution or decision). The Project Team and Kasnitz engaged in a thorough discussion of the meaning behind a CPUC response and when actions should be taken by the Project Team to ensure stakeholders are able to claim intervenor compensation for their participation in this project. Ralston noted that this meeting summary would document Kasnitz's contributions to the entire stakeholder process. Moreover, the Project Team and Kasnitz would connect offline to find appropriate pathways for groups like CforAT and TURN to receive intervenor compensation for contributions to the EUS Study.
- Chris Hogan, CPUC, asked for the expected release date of the draft user guide for the Web Tool. Palmgren hopes for an updated user guide to be published within a week.
- Chris Hogan, CPUC, asked if the final dataset that will be uploaded in January will include 'unknowns' in parts of the data. DNV responded that they don't anticipate being able to update the unknowns in the data based on the data provided by Joint Utilities and that the 'unknowns' represent a small sample of the total.
- Chris Hogan, CPUC, questioned what will be examined in the final dataset. DNV responded that the RASS study produced sample weights for each household, so

some households may be representing 10 households or 10,000 households. DNV is taking note of the energy usage at the equipment level for highly weighted households that use lots of energy to ensure that one household doesn't have undue impact on the averages. Other updates, noted DNV, are more invisible to the user; for example, adding a feature like allowing users to select the number of miscellaneous items in essential use or confidence intervals that are being refined to triple check the calculations. Palmgren elevated that the draft data is more of a ballpark.

Closing Remarks

Smith called out Hank Elgin, Leslie Willoughby, Paula Ham-Su and others for their critical involvement and contributions to the EUS project. Smith ended by looking forward, towards the next iteration of the RASS. He noted that the tool is very useful and hopes the value shines for users moving forward. Smith thanked Common Spark Consulting for the documentation of the stakeholder process and thanked Palmgren, Mahone, and Wilkens for their management and support. Lastly, Smith thanked all stakeholders for their perseverance, incredible insight, and advocacy for customer needs to make this project what it is.

Palmgren and Chui provided the following link to register for the Web Tool: https://caessentialuse.dnv.com/register.

Attachment B

Essential Use of Electricity Final Report

FINAL REPORT

Essential Use of Electricity Study

Prepared for Southern California Edison, Pacific Gas and Electric Company, and San Diego Gas & Electric Company

Date: March 31, 2023

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1 STUDY OVERVIEW

1.1 Background

The California Public Utilities Commission (CPUC) directed Pacific Gas and Electric Company (PG&E)[1] and Southern California Edison (SCE)[2] to conduct "a study of what constitutes essential electricity use for its residential customers." During San Diego Gas & Electric Company's (SDG&E)[3] General Rate Case (GRC), the Administrative Law Judge ordered SDG&E to join PG&E and SCE's stakeholder process for developing an Essential Use Study (EUS) plan.

The EUS plan proposed to use the 2019 Residential Appliance Saturation Survey (RASS)[4] as the foundation for the EUS work. The 2019 RASS is a large-scale, statewide study authorized by California Legislative Code and has been conducted periodically over the past few decades[5]. Its primary purpose is to estimate the saturation of typical residential appliances and the resulting energy consumption of a wide range of common end uses of energy in order to inform statewide energy planning. The study covers the large electrical corporations[6] and a couple of municipal utilities, and is the most comprehensive survey of California residents of its kind. The 2019 RASS was conducted by DNV under contract to the California Energy Commission (CEC).

On September 24, 2020, the CPUC issued Decision (D.) 20-09-021 ("Decision") approving ratepayer funding for an Essential Use Study (EUS) to estimate the essential usage of electricity by residential customers, and to display the resulting estimations on an interactive web tool allowing users to query the results of the EUS. In the same Decision, the CPUC approved the large electrical corporations' request to contract with DNV to conduct the EUS Study, given DNV's experience with the RASS.

1.2 Study objectives

The overarching objective of the EUS was to develop a model of what constitutes essential use of electricity for residential customers of the large electrical corporations including Southern California Edison (SCE), Pacific Gas and Electric Company (PG&E), and San Diego Gas & Electric Company (SDG&E). The EUS provides information that can support the (i) determination of whether residential customers are meeting their basic electricity needs at a reasonable cost, (ii) quantification of a baseline amount of gas and electricity that is necessary to supply a significant portion of the reasonable needs of the average residential customer, and (iii) evaluation of what electricity usage is essential for customers in different geographies throughout California. The objectives of the EUS included:

- To leverage information from the 2019 Residential Appliance Saturation Survey (RASS) project
- To hold stakeholder meetings to gather input in the study design from interested parties
- To conduct qualitative interviews with a sample of RASS respondents to provide insight into the potential underutilization of electricity[7] and to help define areas of interest for additional questions
- To collect supplemental information from a sample of RASS participants about electricity usage related to medical needs
- To model electricity usage necessary for major appliances with cooling and heating at varying thermostat temperature settings for different seasons

[1] CPUC Decision D. 18-08-013

[2] CPUC Decision D.18-11-027

[3] Administrative Law Judge GRC Phase II Application (A.) (A.19-03-002)

[4] DNV GL Energy Insights USA, Inc. 2020. 2019 California Residential Appliance Saturation Study. California Energy Commission. Publication Number: CEC-200-2020

[5] The 2003 RASS was the first time the large Investor-Owned Utilities (IOUs) pooled resources and performed a RASS and Unit Energy Consumption (UEC) study as a team." Quote from Glenn Sharp, CEC. Two more RASS studies followed the 2003 RASS, one in 2009 and one in 2019.

[6] The CPUC jointly refers to PG&E, SCE, and SDG&E as the "large electrical corporations."

[7] Underutilization is the act of using less energy than is essential due to affordability challenges.

- To develop and maintain an interactive web tool that provides users the ability to define the types of equipment to be included in essential use and displays estimates of electricity usage by geographic and demographic segments

1.3 Report organization

This report presents the following in subsequent sections:

- Stakeholder engagement
- Summary of the qualitative interviews
- Summary of the surveys that were implemented as part of the EUS
- Functionality of the EUS Web Tool
- Development of the EUS data underlying the web tool
- Estimates of usage for selected groups of households

Limited analyses are presented in this report. To develop custom analyses, readers are encouraged to visit the EUS Web Tool (https://caessentialuse.dnv.com). The web tool allows users to define scenarios that list what is to be included in essential use and to design crosstabulations of electricity estimates by their desired household characteristics.

2 STAKEHOLDER ENGAGEMENT

Stakeholders participated extensively in the process leading up to the Decision, and while the study was in progress. This section describes stakeholder engagement during the study period.

2.1 Stakeholders

This project benefited from engaged stakeholder participation. In addition to the CPUC, the CEC, and the large electric corporations, the following stakeholders participated in this study:

- The Center for Accessible Technology (CforAT)
  CforAT conducts advocacy work to support policies that expand access to technology, energy, and telecommunications for people with disabilities[8].
- The Public Advocates Office (Cal Advocates)
  Cal Advocates are an independent state entity with the mandate to advocate for utility customers at the CPUC[8].
- The Utility Reform Network (TURN)
  TURN is an independent agency that represents consumers with State and Federal legislators, supports policy development, and organizes communities to advocate for utility consumers[8].

2.2 Kick-off meeting and periodic updates

The stakeholders were engaged during the project development prior to the CPUC's Decision being issued in September 2020. SCE issued a contract with DNV, and the study team conducted a kick-off meeting with the stakeholders in mid-July 2021. DNV and the utilities met with the stakeholders approximately monthly to provide status updates and to request feedback. In all there were sixteen meetings, conducted between July of 2021 and December of 2022. These meetings were conducted online and open to the public.

2.3 Stakeholder feedback

Stakeholder feedback was provided throughout the study period. This section describes two areas where this feedback was especially important.

- Data collection instrument development
  This project utilized two data collection activities: a qualitative interview, where specialized staff conducted calls with customers to gain insight on essential electricity usage and potential underutilization of electricity, and a survey that was developed to investigate incremental electricity usage related to medical needs. Both data collection efforts are discussed extensively in other sections of this document. The stakeholders reviewed these instruments and provided valuable feedback regarding wording, structure, and administration.
- Web tool content and functionality
  The content and functionality of the web tool were discussed during multiple stakeholder meetings as the functionality and user interface were being developed. The stakeholders provided substantial input regarding content (such as which classification variables are more important than others), display, and download of estimates for use in their own analyses.

[8] These descriptions are paraphrased from each organization's website descriptions accessed on February 10, 2023.

3 QUALITATIVE INTERVIEWS SUMMARY

3.1 Qualitative interview introduction

The research team was tasked with conducting at least 75 in-depth interviews with customers of different age groups and genders to capture detailed qualitative information about essential electricity usage and potential underutilization of electricity for differently situated customers. Underutilization of electricity is using less electricity than is essential due to affordability challenges.

This chapter presents a summary of the qualitative interview methodology, implementation, and findings.

3.2 Interview methodology and administration

The qualitative interviews were conducted as in-depth, conversational interviews. The interviews were conducted using a semi-structured format to allow respondents to provide information in their own words, to collect detailed and granular information, and to facilitate the use of probing and follow-up questions by interviewers.

A four-step process was used to collect the qualitative data.

1. Contact, recruit, and schedule respondent for interview.
2. Conduct interview.
3. Complete interview summary.
4. Mail respondent a thank you letter and $25 Visa Reward Card.

Interviews were completed using an Interview Guide that included topics and questions to structure and direct the interview. The project team worked with the utilities and stakeholders to develop the Interview Guide, presenting an initial draft at the July 21, 2021 stakeholder meeting and a revised draft at the September 10, 2021 stakeholder meeting. The final Interview Guide (located in APPENDIX A) included the following sections:

- *Introduction and Recording Consent* – This section established a connection with the respondent and explained the interview purpose.
- *Home and Household Information* – This section collected initial information to understand the household and their home.
- *Electricity Uses by Category* – This section asked respondents about the different electricity uses and devices for cooling, heating, refrigeration, cooking, electronic devices, medical devices, and other devices.
- *Affordability and Trade-offs* – This section asked interviewees about steps taken to reduce expenses or forgo bills because of affordability challenges with paying their electric bill.
- *Electric Underutilization* – This section asked respondents what they would do in the event that their electricity bills were unaffordable, if they have experienced such a situation, and how it impacted them.
- *Electricity Conservation* – This section asked about actions respondents have taken to reduce usage for non-affordability reasons.
- *Demographics* – This section collected limited demographic information about each respondent.
- *Closing* – This section thanked respondents for their time and confirmed information to mail them their reward card.

Sample

The sample source for the qualitative interviews was respondents that completed the 2019 Residential Appliance Saturation Study (RASS) Survey. The project team worked with the utilities to collect current contact information for RASS respondents.

The project team selected a purposive sample that targeted Low- and Moderate-Income (LMI) households that had an electric account with PG&E, SCE, or SDG&E.

To ensure qualitative interviews were conducted with a diverse group of households, the sample was stratified and targeted based on the following characteristics:

- Electricity Usage Level from the 2019 RASS electricity consumption data (Low, Moderate, High)
- Medical Baseline Enrollment from the utility current data (Yes / No)
- Household Type from the 2019 RASS survey data (Seniors and/or Children, No Seniors or Children)
- Cooling Equipment (Yes / No) from the 2019 RASS survey data

APPENDIX B summarizes the sample selected for the research.

Implementation

Initial pretest interviews took place between December 17, 2021 and January 4, 2022 (excluding holidays). A total of 8 pretest interviews were completed. Based on the pretests, small refinements were made to improve the Interview Guide and approach. The remaining interviews occurred between January 13, 2022 and February 19, 2022.

Staff from APPRISE, a research firm that specializes in conducting research involving low-income and hard-to-reach consumers, was engaged as a sub-contractor to DNV to conduct the interviews. APPRISE staff contacted sampled households between 9 AM and 8 PM Pacific Time. Interviewers made multiple call attempts at varying times and days, left voicemail messages, and provided a toll-free telephone number for respondents to return calls. Primary calling was conducted in English. However, supplemental calling was made in Spanish and Mandarin to households identified as potentially Spanish- or Mandarin-speaking. Interviews were recorded with respondent approval to facilitate completing interview summaries.

A total of 77 interviews were completed. The average interview length was 33 minutes. APPENDIX C provides the calling disposition information.

Research Limitations

The in-depth interview findings have three important limitations related to the purpose and approach used to conduct the research.

- First, the purpose of the in-depth interviews was to collect qualitative information to help identify common themes and unique or interesting situations among a small group of households with varying characteristics. The results and findings provide valuable information about the diversity of household needs and experiences. However, they are not representative of the Low-and-Moderate Income (LMI) electricity customer population or of all LMI RASS respondents, nor do the findings provide measurable information about how frequently in a population or subgroup specific items may be present.
- Second, based on the complexity of the topics, the interviews were conducted by trained interviewers over the telephone to encourage responsiveness and collect more granular information using probes. While efforts were made in the Interview Guide to encourage respondent comfort and engagement, it is important to remember that the presence of an interviewer and the mode of conducting interviews by telephone can produce differences in responses, including social desirability impacts[9].

[9] Social desirability impacts are responses provided by respondents that they believe will be viewed favorably by the interviewer.

- Finally, quotations presented in this section are not word-for-word quotations, but may combine information respondents shared during the conversation or in response to multiple questions. Descriptive characteristics are included with the information such as utility, electricity usage level, income eligibility group[10], and CEC climate zone group.

3.3 Interview respondent characteristics

This section presents information on the characteristics of the in-depth interview respondents and their households in Table 3-1 through Table 3-9. The information was obtained from 2019 RASS data, current utility data provided for the EUS or the EUS interviews themselves.

Table 3-1. Interview respondent electric utility (2019 RASS data)

Electric Utility	Count	Percent
PG&E	28	36%
SCE	24	31%
SDG&E	25	33%
Total	**77**	**100%**

Table 3-2. Interview respondent gender (EUS interview data)

Gender	Count	Percent
Female	43	56%
Male	34	44%
Total	**77**	**100%**

Table 3-3. Interview respondent age (EUS interview data)

Age range	Count	Percent
18-54	20	26%
55-64	28	36%
65+	29	38%
Total	**77**	**100%**

[10] Categories of "CARE eligible" and "FERA eligible" represent that responses on the 2019 RASS survey for household income and number of residents indicate a household is potentially eligible for CARE or FERA, with no indication whether a household has applied for one of these programs.

Table 3-4. Interview respondent Medical Baseline enrollment (Current utility data)

Medical Baseline status	Count	Percent
Enrolled	15	19%
Not Enrolled	62	81%
Total	**77**	**100%**

Table 3-5. Interview respondent electricity usage level (2019 RASS data)

Usage level	Count	Percent
High	25	32%
Moderate	26	34%
Low	26	34%
Total	**77**	**100%**

Table 3-6. Interview respondent household type (2019 RASS data)

Type of household	Count	Percent
Children, No Seniors	16	21%
Seniors, No Children	20	26%
No Seniors, No Children	41	53%
Total	**77**	**100%**

Table 3-7. Interview respondent housing type (2019 RASS data)

Type of household	Count	Percent
Single Family Detached	48	62%
Apartment or Condo (2-4 Units)	5	7%
Apartment or Condo (5+ Units)	16	21%
Mobile Home	4	5%
Townhouse, Duplex, or Row House	4	5%
Total	**77**	**100%**

Table 3-8. Interview respondent CEC climate zone group (2019 RASS data)

CEC climate zone group	CEC Climate Zones	Count	Percent
Coastal	1, 2, 3, 4, 5, 6 and 7	39	50%
Inland	8, 9, 10, 11, 12 and 13	32	42%
Desert	14 and 15	3	4%
Mountain	16	3	4%
Total		**77**	**100%**

Table 3-9. Interview respondent income eligibility group (combination of 2019 RASS data and current utility data) [11]

Income group	Count	Percent
Income and number of residents reported in RASS indicate eligible for CARE, or currently enrolled in CARE	60	78%
Income and number of residents reported in RASS indicate eligible for FERA, or currently enrolled in FERA	5	6%
Moderate income based on RASS survey response	12	16%
Total	**77**	**100%**

3.4 Interview findings for electricity bill affordability and trade-offs

This section and subsequent sections summarize responses from the interviews. The interview asked respondents whether their households had faced challenges in paying their electric bill and needed to take any steps to reduce expenses, forgo bills, or lower electricity usage because of affordability concerns. As shown in the table below, about half of the respondents reported they had experienced affordability issues in the past when paying their electric bill.

[11] Respondents were assigned to one of three income-eligibility categories using utility enrollee data and income information reported on the RASS. 56 of the 60 respondents included in the CARE income eligibility group were confirmed as enrolled in CARE, and 4 of the 5 respondents included in the FERA income eligibility group were confirmed as enrolled in FERA.

Table 3-10.Interview respondents describing electric bill affordability challenges

Faced prior challenges affording electricity bill	Count	Percent
Yes	40	52%
No	37	48%
Total	**77**	**100%**

For the respondents who reported affordability issues in paying their electric bill, approximately half mentioned skipping other bills, 45% reported reducing or forgoing necessities like food and medical care, and 68% mentioned making changes to try to reduce their electricity bill.

Table 3-11. Interview respondents describing actions to pay electric bill

Actions taken to pay electric bill	Count	Percent
Skipped other bills	20	50%
Reduced or skipped purchasing necessities	18	45%
Reduced electricity usage	27	68%

Below are examples of actions respondents reported taking to help pay their electric bill.

- “The electric bill is definitely the heftiest bill that I have. I have skipped internet and TV bills to pay for it...I have to have lights, and I am on social security.” - *SDG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*

- “I have had to skip the phone bill a handful of times. It was more important to have electricity than the phone.” - *PG&E Customer, Medium usage, Moderate Income, CEC Coastal Climate Zone*

- “There are four of us – me, my wife, and two kids…I was still working through most of COVID, but toward the end I got laid off. Even though my wife started working, we’ve got one income right now, so that’s what we’re living off of, and we do what we can. The rent and electric bills went up. I just skipped paying the credit card bill this month. They’ll get their money when they get their money, but it’s important for us to keep the lights on. I expect this will impact our credit scores and ability to buy a house or car.” - *SDG&E Customer, Medium usage, CARE Eligible, Inland Climate Zone*

- “I skipped paying for car insurance when the bills got too high. The electric bill is more important because I need the electric for daily things like cooking. I had to do this for a few months. It was stressful – I didn’t feel safe while out driving.” - *SDG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

- “There’s always a little bit of shuffling of money going on. I have had to pay less of the City Water bill and the credit card bill to pay PG&E. I still get a late charge from the city, but as long as you call them, they won’t shut you off. For the

credit card, I am able to catch up later. I normally pay over my due amount, so I am usually alright if I have to slide a month." - *PG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*

- "I did have to cut back on some of my medical bills and expenses to pay my electric bill when I was self-employed. I'm a diabetic. I wasn't used to doing that, but I needed to just make ends meet." - *SCE Customer, High usage, CARE Eligible, CEC Coastal Climate Zone*

- "We sometimes cut down on the food, the groceries. We don't want to sit in the dark"- *SDG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

- "In my time here in California, yeah. It's just so expensive, but we've done better in cutting the bill. I moved from renting to owning, and that helped a lot. In 2020, it was like the system was broke. It took three or four months for my unemployment to kick in. I'll skip things like dental care, things like that, to pay my electric bill. My teeth aren't as healthy. I used to have two cleanings a year, but I haven't been able to recently and the last time I went in I had deep pockets and two cavities." - *SDG&E Customer, High usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

- "To pay the electric bill, we have cut back on clothes, shows, going out, and things that can be done at a different time. It has not affected us because I try to teach my kids about affordability and talk to them about how sometimes issues come up and we need to give up other things for something else." - *SCE Customer, Medium usage, FERA Eligible, CEC Inland Climate Zone*

3.5 Interview findings for cooling

Common Cooling Needs and Equipment

Table 3-12 below shows the number and percent of respondents who reported having and using different types of cooling equipment. While most respondents mentioned use of fans, about 53% reported using some form of air conditioning.

Table 3-12. Interview respondents air conditioning equipment

Equipment type	Has equipment in home		Uses equipment in home[12]	
	Count	Percent	Count	Percent
No Air Conditioning (Fans Only)	32	42%	36	47%
Central Air Conditioning	27	35%	25	32%
Evaporative cooler (swamp cooler)	3	4%	3	4%
Portable AC only (window/wall)	15	29%	13	17%
Total	**77**	**100%**	**77**	**100%**

[12] Four respondents with air conditioning equipment reported they did not use this equipment and are counted in the "No Air Conditioning (Fans Only)" category.

- Seasonal Summer Usage – Respondents in less moderate weather regions reported regular use of air conditioning equipment during the warmer summer months.

  – "We have a single central AC unit. We use it between May-October and usually keep it around 79 degrees. It mostly runs from 1pm-7pm in the daytime." - *SCE Customer, Medium usage, Moderate Income, CEC Inland Climate Zone*

- Usage on Very Hot Days Only – Some respondents in more moderate weather regions did have air conditioning equipment present but said they only used this equipment a few times a year when temperatures were exceptionally hot.

  – "Well, I have air conditioning, but I don't like to use it - it's expensive. If it gets real, real, real, real hot, then I will for a little bit. I'll turn it on for an hour or two. But normally, I don't." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*

- Use for Medical Conditions/Needs – 4 respondents mentioned air conditioning use specifically to support health and comfort for household members who have medical conditions that would be exacerbated by warm indoor temperatures and/or humidity.

  – "My sister is 65, she cannot tolerate heat, she gets sick, we have to keep her cool. She has a heart problem, so we have to keep it cool for her." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*

  – "The heat can bring symptoms for my wife of fatigue, weakness, and, just in general difficulty accomplishing anything or thinking. We are on Medical Baseline and on the list to be notified to go to a cooling center." - *SCE Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Coastal Climate Zone*

  – "I live in a part of California where it gets really hot in the summertime…I have asthma and need A/C to breathe. I only use it when I need it to breathe. It used to be maybe two weeks out the summer, so I actually didn't have an A/C and would just go to the mall. Now, it's all summer long, pretty much. There are times that the air quality is very poor and that could trigger an asthma attack" - *SDG&E Customer, High usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

  – "Loss of air conditioning would probably have a negative impact on our health. My housemate has some health conditions and is easily overheated." - *SDG&E Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*

- Usage during Wildfires – One respondent mentioned air conditioning use specifically related to wildfires and the impact of wildfire smoke on air quality.

  – "Part of the reason I chose to have central air installed is because we've been having very bad fires in California. Normally on a hot day, one could open the windows and cool off the house. You open the windows early morning, and you bring in cool air. But because of the smoke, we can't do that anymore." - *PG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*

Actions taken to manage cooling usage

In general, most respondents perceived that cooling use was a major driver of their home electricity usage during the days or months when it was used. Households reported the following actions to help limit usage within their budgets:

- Limit use during peak hours
  - "If we do turn on the air conditioning, we try to plan it away from the 4-9 period [to avoid peak hours]…If it is a hot day, we will turn it on around noon and run it until 3…we turn it on for an hour or two and ride that off until evening." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*
  - "I already get notices about peak hours, so I try and not use then." - *SDG&E Customer, High usage, Moderate Income, CEC Coastal Climate Zone*
- Limit use to very hot days only
  - "I only use the swamp cooler if it's over 100 degrees. I don't like using it because it runs the water, and we're on a well, and that takes electricity and water, which I can't afford to use." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*
  - "I don't use the AC all that much because it jacks up the bill significantly. I maybe use it 30 days out of the year. I use two fans to help keep the house comfortable in the summer." - *SDG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*
- Limit cooling area
  - "We block off several rooms already to limit cooling and heating." - *PG&E Customer, High usage, CARE Eligible, CEC Coastal Climate Zone*
- Use other cooling approaches
  - "The duplex faces the northeast, so sun hits all the windows. I try to keep it cool in here with just the fan…I had to put cardboard in the windows to block the sun [and keep it cool]. I will use the wall air conditioner in the living room when it gets really hot and usually set it on 70 degrees." - *SCE Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*
  - "The upstairs has a mini split that has AC, but we do not use it. There is no need to. Me and my tenants use the windows and the ceiling fans in the summer." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*
  - "We try hard to conserve energy…I would say maybe by 11 or noon, you know, and then of course at 4 o'clock when it gets more expensive, we try to have the house all cool by then, you know, and close it up…We do have some ceiling fans, we have 2… it's about the same as the air conditioner. I mean, I would use them before I used the air conditioner." - *SDG&E Customer, Medium usage, Moderate Income, CEC Coastal Climate Zone*

Actions taken or expected related to cooling when faced with affordability crisis

If faced with an affordability challenge, most households reported some efforts to reduce air conditioning consumption. These included:

- Reduced air conditioning usage
  - "I use it sparingly now but would try not to turn it on at all." - *SDG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*
  - "I would only turn the AC on for certain periods of time." - *SDG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*
- Shut off parts of home
  - "We would not turn on the air conditioning for so many hours and we would all sleep in one room if we needed to." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*
- Switch to fans
  - "My roommate brought his portable AC to our house. The electric bill tripled this month because it was so inefficient. We don't have that now and use ceiling fans and portable fans when it's hot or just for circulation." - *SCE Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*
- Other approaches
  - "My disability is in my neck. If I don't have a cooler, it really bothers me. If I couldn't be cool, I would go to my daughter's house for AC." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*
  - "I have to be air conditioned when it's hot because I can't stand the heat. I would probably spend my time in these cooling centers [if I couldn't use my air conditioner]." - *PG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Coastal Climate Zone*
- Limitations in changing usage
  - "It would be hard to reduce the air conditioning usage. I don't it use it much already and it has to be on when the dogs are home alone." - *SCE Customer, Medium usage, CARE Eligible, CEC Mountain Climate Zone*

Impacts of reduced or limited cooling usage on health, safety, and well-being

- Discomfort
  - "We tend to use it to keep the temperature comfortable, so if they were unavailable, the temperature would be unbearable" - *SDG&E Customer, Medium usage, FERA Eligible, CEC Coastal Climate Zone*

- "It would be extremely uncomfortable. It can get over 100 degrees in here on a summer day" - *PG&E Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*

- Health issues or triggers
  - "It makes it difficult for me to breathe, with excessive heat – I have COPD" - *SCE Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*
  - "I cannot stand the heat...I get dizzy, light-headed." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*
  - "I am an asthmatic and my asthma could possibly be affected by the heat. The AC helps clear the allergens." - *SDG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

- Minimal impacts
  - "It would be annoying [to be unable to cool as much as normal]. I'd feel inconvenienced, but it wouldn't be too big of an issue". - *SCE Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*

Essential use & underutilization findings related to cooling

1. Low and moderate-income households in warmer regions generally perceive that air conditioning usage is a major contributing factor to electricity bills and report taking active steps to limit air conditioning usage.
2. When faced with affordability challenges, some households have or would reduce or forgo some air conditioning usage, while others report that they already limit cooling use to a minimal amount to maintain well-being or basic comfort.
3. The primary impact respondents mentioned from reducing air conditioning use due to affordability issues was increased discomfort in their homes. However, respondents with older household members or members with medical needs also mentioned negative health impacts and safety dangers from reducing air conditioning use.
4. Respondents viewed air conditioning use as essential for the following primary reasons:
   a. Needed to avoid very hot or dangerous indoor temperatures.
   b. Needed to maintain a reasonable comfort level in the home.
   c. Needed during wildfire season when windows cannot be safely opened to cool home.
   d. Needed for specific medical needs that rely on regular air conditioning usage to help prevent worsening medical conditions.

3.6 Interview findings for heating

Common heating needs and equipment

Table 3-13 below shows the number and percent of respondents who reported having and using different types of heating equipment.

Table 3-13. Interview respondents heating equipment

Equipment type	Type of equipment in home		Uses equipment in home[13]	
	Count	Percent	Count	Percent
No heating equipment	9	12%	15	19%
Plug-in or portable heaters only	29	38%	24	31%
Electric heating system	12	15%	11	14%
Non-electric heating system	27	35%	27	35%
Total	**77**	**100%**	**77**	**100%**

- Seasonal winter usage – Respondents in areas with defined seasons reported frequent use of their systems in the winter or during colder days.
  - "My wife and I have a heat pump we use steadily in the winter. We set it to 74 in the day and 68 at night. A fan unit turns on every ten minutes to circulate air, so the heater doesn't run as much." - *SDG&E Customer, High usage, Moderate Income, CEC Coastal Climate Zone*
  - "We'll use it when we wake up, I'll turn the heater on to get the chill out of the air, and then we basically keep it around 68, 70 during the day." - *SCE Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*
  - "I use it when it's as cold as now, hitting 30s and 40s. I turn it on in the morning for about half an hour, generally only in the winter months." - *PG&E Customer, High usage, FERA Eligible, CEC Inland Climate Zone*
- Usage on very cold days only – Some respondents reported that their system was rarely used because of the area they live in or to limit usage because of the expense.
  - "It's hardly ever cold enough that we feel like we need to use the heat. Maybe 1-2 weeks throughout the whole year." - *SCE Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*
- Electrical heating use to supplement or substitute main system – Several respondents mentioned the use of plug-in space heaters to help warm parts of their home to try to limit use of their main heating system.
  - "I have a propane heating system, but I also use 2 portable electric heaters. I use the electric ones to heat up the bathroom in the morning or evening when I want to take a shower." - *SDG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

[13] Six respondents with heating equipment reported they did not use this equipment and are counted in the "No Heating Equipment" category.

- "The wall heater we have is so old and runs the bill up very high. We decided to turn that off and buy a small electric heater instead. We use it early in the mornings around 2 AM to about 10 AM. I bundle up to keep warm outside of that." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*

- "I have a radiator style portable heater in my bedroom that I use at night. I usually set it to around 64." - *SCE Customer, Medium usage, CARE Eligible, CEC Mountain Climate Zone*

- Use for medical conditions/needs – A small number of respondents mentioned that avoiding cold indoor temperatures was important due to health challenges. However, these were less common than respondents reporting a need for cooling to avoid hot temperatures and maintain indoor moisture levels.

  - "I have arthritis, so, when I get cold, it hurts." - *SDG&E Customer, High usage, CARE Eligible, CEC Desert Climate Zone*

  - "I have a problem of arthritis, you know, so I get more pain with the cold." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*

  - "The heat helps my sister with breathing issues." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*

<u>Actions taken to manage heating usage</u>

Households that used electricity to help heat their home reported different steps to help maintain their bill at an affordable level.

- Limit amounts or times used

  - "I try to keep not having to turn the heat on until after Thanksgiving." - *SDG&E Customer, Low usage, Moderate Income, CEC Coastal Climate Zone*

  - "I took 3 degrees off the house temperature this year. The cost of gas is through the roof, and honestly, I can't afford to keep my house warm this year. I took a big raise this year too, because I saw this coming, and it wasn't enough." - *PG&E Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*

- Limit heated areas in home

  - "I usually seal off the house, close the doors to different parts of the house, so I can utilize the heat in one specific location." - *SCE Customer, High usage, CARE Eligible, CEC Coastal Climate Zone*

- Other approaches

  - "If I had to, I could sleep by my stove. I've done that when the power is out." - *SCE Customer, Medium usage, CARE Eligible, CEC Mountain Climate Zone*

- "In order to keep the bill down, we just try to use lots of blankets and throws, that sort of thing." - *SDG&E Customer, High usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

Actions taken or expected related to heating when faced with affordability crisis

If an electric bill is unaffordable, households reported efforts to avoid using their electric heating appliances when possible. These included:

- Reduced heating usage
  - "I would wait to use our electric heater until 7:30 AM rather than running it earlier like usual." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*
  - "We have a portable heater for our child who is anemic. We use it on the rarer colder days for 20-30 minutes in the morning, mid-afternoon, later afternoon, and at night. I would stop using that completely if needed. We have a chimney in the house that helps with the main heat." - *SCE Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*
- Close parts of home to heating
  - "If this happened, I would block off the master bedroom because the living room gets the hottest." - *SDG&E Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*
- Reduce supplemental heating usage
  - "I am trying to keep my bill low as it is anyway, but if I faced a situation where I needed to lower my bill, I would not use the portable electric space heaters at all." - *SDG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*
- Limitations in changing usage
  - "I don't know what else I could do. I can't block off rooms because the heat is a central and comes into each room. I could close the vents if I can get someone to come and close them for me." - *PG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*

Impacts of reduced or limited heating usage on health, safety, and well-being

- Health issues or triggers
  - "We have had to stop using the heat before. We had to have the kids sleep in the living room instead of their bedroom. I think the kids wound up with more colds." - *PG&E Customer, Medium usage, Moderate Income, CEC Coastal Climate Zone*

- Safety

  – “Being cold is definitely something that would affect us more than the heat would. It is me and my 7-year-old grandson in the home, and I would be worried about him getting cold.” - *SDG&E Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*

- Minimal impacts

  – “If we couldn’t use the heat, I’m sure we’d be fine; we’d just throw on some warmer clothes and more blankets and things [on the rare colder days].” - *SCE Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*

Essential use & underutilization findings related to heating

1. Household use of heating varied based on climate and household member needs.

2. One common theme was that many households attempt to limit use of their main heating system, especially if it is older, and will use supplemental plug-in heaters when they only need limited rooms to be warm. Some households will potentially underutilize electricity for heating if their equipment is older and they have concerns about the impact that operating the equipment as much as they may like would have on their bills.

3. Many households report that if they needed to, they would be willing to make changes to heating usage, even if it would negatively impact their comfort. Steps include reducing frequency of use, limiting areas in the home that are heated, wearing additional layers of clothes, and relying on fireplaces or alternate heating sources.

4. Respondents viewed heating use as essential for the following primary reasons.

   a. Needed to maintain a reasonable comfort level in the home.
   b. Needed to avoid coldness during rare very cold days.
   c. Needed to supplement a non-electric heating source.
   d. Needed for specific medical needs that rely on regular heating usage to help prevent worsening medical conditions.

3.7 Interview findings for medical devices

Interviews were completed with 15 households that were enrolled in Medical Baseline. Medical Baseline respondents were asked about their electricity needs for medical devices and purposes, the importance of this usage, and the impacts that household members with medical conditions would face if they could not maintain access to electricity service.

The table below summarizes key information about the Medical Baseline households. All 15 respondents reported that the ability to continue use of their medical devices on a daily or scheduled basis was essential to their well-being and health.

Table 3-14. Interview respondents Medical Baseline household needs, devices, and impacts of limiting usage

ID And Type	Medical Issues in Household	Device Needed/Used	Indicated Use was Essential / Difficult to Reduce	Impacts of Limiting/Not Maintaining Usage
SCE Customer (Medium use, CARE)	Heart condition	Pacemaker	Yes	Weakness, fatigue, difficulty thinking
SCE Customer (High use, Moderate Income)	Breathing Issues; Low oxygen levels	Oxygen machine	Yes	Detrimental health impacts for breathing
SCE Customer (Medium use, CARE)	Breathing issues	Oxygen machines, Air purifiers	Yes	Detrimental health impacts for breathing
PG&E Customer (Low use, CARE)	Paraplegic, Breathing issues	Wheelchair, Chair lift, oxygen compressor	Yes	Immobility, detrimental health impacts for breathing
SCE Customer (Medium use, CARE)	Mobility issues	Wheelchair, electric bed	Yes	Immobility
SCE Customer (Low use, CARE)	Diabetic, Breathing issues	Oxygen machine	Yes	Detrimental health impacts for breathing
SCE Customer (Low use, CARE)	Breathing issues	Nebulizer, CPAP	Yes	Detrimental health impacts for breathing
PG&E Customer (Low use, CARE)	Mobility issues	Wheelchair	Yes	Immobility
PG&E Customer (High use, CARE)	Breathing issues	CPAP	Yes	Detrimental health impacts for breathing
PG&E Customer (High use, CARE)	Breathing issues	CPAP	Yes	Stroke
PG&E Customer (Low use, CARE)	Spinal/back issues	Nevro spinal stimulator implant	Yes	Increased pain, potential surgery
PG&E Customer (Medium use, CARE)	Breathing issues	Oxygen machine	Yes	Detrimental health impacts for breathing
SCE Customer (Low use, CARE)	Breathing issues	CPAP (2)	Yes	Loss of sleep

ID And Type	Medical Issues in Household	Device Needed/Used	Indicated Use was Essential / Difficult to Reduce	Impacts of Limiting/Not Maintaining Usage
SDG&E Customer (Medium use, CARE)	Breathing issues	Nebulizer, humidifier	Yes	Detrimental health impacts for breathing
SDG&E Customer (High use, CARE)	Asthma	Nebulizer, CPAP, hospital bed	Yes	Detrimental health impacts for breathing

Below are detailed quotes from Medical Baseline respondents about their medical needs and electricity usage.

- Health and safety

  – "I use a CPAP every night. It would really impact me to not use the CPAP. There's sometimes I've gone all night without using it, but I don't know how advantageous that is. They keep you breathing at night-time, so you've got constantly air going into your lungs, so you don't stop breathing." - *PG&E Customer, High usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

  – "Without my oxygen, I'd wind up in the hospital. It would be a threat to my life [to go without it for several days]." - *SCE Customer, Low usage, CARE Eligible, Medical Baseline, CEC Desert Climate Zone*

  – "We have an oxygen tank; we have two actually. One that plugs in an (*sic*) one that is battery operated. The main one is plugged in everyday, certain times of the day, and then at night. She has to have the oxygen at certain times, and we can't control her oxygen needs." - *SCE Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

  – "I just got oxygen, that's all. I use that every day. It would affect my breathing to not use it. That wouldn't be too good. I might be in pain. I'd probably have to go to urgent care or one of those places. When I need to use it, I have to use it, that's it…That's life or death." - *PG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Coastal Climate Zone*

  – "I have a steamer that I plug into the wall and releases scented air, so that does help me breathe better. I have a nebulizer that I could use up to 2 or 3 times a day, or that I may only use once in a while. I couldn't breathe too well without these, and there's a possibility that I could die. I would not change use of them at all, they're necessary." - *SDG&E Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

  – My wife and I would not be able to change our use of the CPAP machines – that's kind of a necessity. The last time we had some power issues, we went to rent a motel somewhere and sleep overnight, and that's pretty extreme." - *SCE Customer, Low usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

- Mobility
  - "I haven't walked for 5 years; I use an electric wheelchair. We have to charge the lift every night. I have an oxygen pump, one of those ones that makes oxygen, used pretty much nightly…If I couldn't use electricity, I can get by without it for a few days. I'd just stay in bed." - *PG&E Customer, Low usage, CARE Eligible, Medical Baseline, CEC Coastal Climate Zone*

  - "I use my power wheelchair every day. I plug it in at night, and then when I get up in the morning, I usually get my chair and go around the house and then I use it when I go downtown. I couldn't do anything without it. My arms are shot, I can't move a regular manual chair. My doctor told me to get a power chair. That would be a basic power use that I need for everything – to go to the doctor's office or go anywhere at all. The power chair is the most important thing to me." - *PG&E Customer, Low usage, CARE Eligible, Medical Baseline, CEC Coastal Climate Zone*

  - "I am handicapped, I have an electric wheelchair that charges, I have an electric bed, and I have an electric lounge chair. I use my electric wheelchair every single day. It's the only way I can get out of bed and get there and do things…I cannot modify the use of the chair, because this is my way of getting around. I do have a regular wheelchair, and I have used it in the past, but I am not comfortable using it, especially with my husband pushing it." - *SCE Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

Medical needs requiring electricity for households not enrolled in Medical Baseline

Respondents who were not enrolled in Medical Baseline were also asked if any member of the household used a medical device that required electricity or had a medical condition that required using heating, cooling, or air purifying. 12 respondents reported a medical need in the household for electricity usage. The table below displays the summary information for these households. 10 of the 12 respondents indicated the medical usage was essential or difficult to modify, while 2 indicated they could or would modify their usage if needed due to affordability concerns.

Table 3-15. Interview respondents non-Medical Baseline household needs, devices, and impacts of limiting usage

ID and type	Medical issues in household	Device needed/used	Indicated use was essential / difficult to reduce	Impacts of limiting/not maintaining usage
SDG&E Customer (Low use, CARE)	Heat sensitivity	Cooling to maintain temperature	Yes	Low-level health problems
SDG&E Customer (Medium use, CARE)	Congestive Heart failure; Asthma	Heart monitor, A/C, Nebulizer	Yes	Potential cardiac event
SDG&E Customer (Medium use, CARE)	Heart condition	Heart Monitor, Blood Pressure Machine	Yes	Hospital visit
PG&E Customer (Low use, CARE)	Sleep Apnea	CPAP	Yes	Fatigue

ID and type	Medical issues in household	Device needed/used	Indicated use was essential / difficult to reduce	Impacts of limiting/not maintaining usage
PG&E Customer (High use, CARE)	Heart condition	Cooling to maintain temperature	No	Fatigue, Nausea
PG&E Customer (Medium use, CARE)	Raynaud's Syndrome	Heater, humidifier	Yes	Dizziness
PG&E Customer (Medium use, Moderate Income)	Neuropathy	CPAP	Yes	Detrimental health impacts for breathing
PG&E Customer (Low use, CARE)	Back issues	Electric recliner, LifeAlert	Yes	Increased pain
PG&E (High use, CARE)	Paraplegic; Asthma	Wound Vacuum; Nebulizer	Yes	Hospital visit
PG&E Customer (Medium use, CARE)	Breathing issues	CPAP	Yes	Detrimental health impacts for breathing
SCE Customer (High use, CARE)	Breathing issues	Air purifier	No	Negligible
SCE Customer (High use, Moderate Income)	Neuropathy, Breathing issues	Oxygen machine, Nebulizer, Hospital bed	Yes	Detrimental health impacts for breathing

Below are detailed quotes from these respondents about their medical needs and electricity usage.

- Health and Safety

  – "I have a resident that's a paraplegic. He has a wound vacuum to vacuum his wound out twice a day to avoid infections." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*

  – "I have a heart monitor that is like a defibrillator in my chest. It takes readings of my heart that get sent to the doctor. Without power, I'd be without a reading if something happened with my heart." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*

  – "I have a back condition, so I use the recliner a lot. And I would not be able to go without that. And I have once, the power went off, and I was reclining, and I couldn't get out of the chair!" - *PG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

– "I use a CPAP machine nightly. You know, the short-term effect of not using it wouldn't be a problem, but the long term would be. The machine was recalled, and I went without it a few months. I didn't die but was just tired." - *PG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

– "I have a nebulizer and a hospital bed. When I exercise, I need oxygen. If I don't get enough oxygen, it would affect my whole body." - *SCE customer, High usage, Moderate Income, CEC Coastal Climate Zone*

Essential use & underutilization findings related to medical devices

1. All 15 households enrolled in Medical Baseline reported substantial health conditions or issues. The Medical Baseline households did report regular use of electricity for managing medical needs or preventing substantial negative health impacts.
2. 12 of the 61 households that were not enrolled in Medical Baseline reported a need for electricity to help operate devices that assist with medical conditions. These households also reported notable health conditions.
3. Almost all households that mentioned medical-related usage viewed that usage as essential, indicating they used their devices as needed to be safe, healthy, and ensure well-being. In the event of an affordability crisis, respondents reported they would make other changes to reduce usage before making modifications to their medical-related electricity usage.

3.8 Interview findings for kitchen and refrigeration

Common kitchen and refrigeration needs and equipment

Table 3-16 below shows the number of respondents who reported having and using different types of electric kitchen appliances, and whether the use of those appliances was essential and/or difficult to reduce or modify. While microwaves and toasters were the most commonly used electric kitchen devices, a minority of respondents indicated these were essential or difficult to reduce regular usage of. Electric stovetops and cooktops were reported by about 40% of the respondents, and more than 70% of these respondents indicated during the interview that the stovetop or cooktop was essential for their household, and it would be difficult to reduce or change the usage of this device.

Table 3-16. Interview respondents kitchen appliances

Kitchen appliances	Used by household		Indicated use was essential / difficult to reduce	
	Count	Percent	Count	Percent who used device and indicated use was essential
Electric stovetop or cooktop	31	40%	22	71%
Electric range or oven	33	43%	9	27%
Microwave	72	94%	27	38%
Toaster/toaster oven	62	81%	6	10%
Electric beverage devices	45	58%	8	18%
Pressure cooker or slow cooker	31	40%	3	10%
Other (air fryers, niche devices)	36	47%	4	11%

The interview also asked respondents about their refrigerators and freezers and how they use them. Table 3-17 provides information on the respondents who reported one refrigerator or multiple refrigerator/freezer units, and how the respondent characterized their willingness or ability to reduce or change their usage. As shown below, 34 respondents reported secondary refrigerators or freezers. For those with additional refrigeration units, 14 indicated the secondary units were essential because of their family size, family needs, or other reasons.

Table 3-17. Interview respondents secondary refrigerators or freezers

Secondary refrigerators or freezers	Used by household		Indicated use was essential / difficult to reduce	
	Count	Percent	Count	Percent who used device and indicated use was essential
Second refrigerator/freezer	34	44%	14	41%

The following are examples of what respondents reported about kitchen appliance and refrigeration use, the importance of different appliances, and steps taken in the event of a crisis that would limit or prevent their use.

- Kitchen appliances

  – "I'd do some of my prep work and things like that in the morning if I need to, on off hours for food prep. Using mixers, blenders, chopping items, things like that." - *SCE Customer, Low usage, FERA Eligible, CEC Coastal Climate Zone*

  – "We'd try and cook everything like at once, and then put it all in the fridge and the freezer, and just reheat as needed. Instead of everybody just kind of cooking when they feel like it, I would control the times…We would utilize the stove top even more for things if we could…I also have a grill outside, I would utilize the grill too." - *PG&E Customer, High usage, FERA Eligible, CEC Inland Climate Zone*

  – "I'd have to rely on canned foods and eat things cold…I would use [the cooking equipment] minimally" - *PG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

  – "Well, I would have to switch to gas [appliances] or like in the summer we could use our barbeque." - *PG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*

  – "If I faced a crisis with affording the electric bill, I would stop using the toaster and microwave and just use the stovetop instead. That could substitute for most other things. I would need to get up early to cook things." - *SCE Customer, Medium usage, FERA Eligible, CEC Inland Climate Zone*

  – "I have received notices of using more energy than average households like mine. I think maybe the electric kettle was the cause of higher use because I kept that on 24 hours a day. I have started unplugging it at night and testing

out leaving it on versus only turning it on when needed to see if that makes a difference." - *PG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

- Refrigerators and freezers

  – "I'd consider unplugging the second fridge. But we would probably have to go buy everything more often." - *SDG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*

  – "I don't think we would change the refrigerator use. Our fridge is new and very efficient. We also use it to store my wife's medicine." - *SCE Customer, Medium usage, CARE Eligible, Medical Baseline, CEC Coastal Climate Zone*

  – "I have a minifridge next to my office desk with mostly my food. If I needed to, I would unplug that and move my food into the main refrigerator." - *SCE Customer, High usage, Moderate Income, CEC Coastal Climate Zone*

  – "If I have to, I've shut the second fridge down before… I don't need it plugged in just to keep an extra milk or some meat in there." - *PG&E Customer, Medium usage, CARE Eligible, CEC Inland Climate Zone*

  – "I use my standalone freezer mostly for meat when I can find it cheap enough. It would cost me a lot of money to not use it since I wouldn't be able to store meat when it is cheaper to buy" - *PG&E Customer, High usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*

Essential Use & underutilization findings related to kitchen and refrigeration

1. Most households use at least one or two electric kitchen appliances regularly and consider their usage essential. The most common essential items were the stovetop and microwave.
2. When asked about changes households would make in the event of an affordability crisis, households mentioned changing cooking habits, reducing use of kitchen appliances perceived to use the most electricity, using appliances that operate on natural gas more, and relying on purchased or prepared meals that did not require cooking.
3. For refrigeration, 34 households mentioned that they had secondary or multiple refrigerators or freezers. 14 of these households indicated that those devices were important and difficult to avoid usage of because their family size was too large for one refrigerator, or they viewed the benefits of reduced trips to the store as greater than the electricity savings from avoiding their usage.

3.9 Interview findings for electronics and other appliances

Common electronics and other appliance needs and equipment

Table 3-18 below shows the number of respondents who indicated using different types of electronic devices in their home, and whether the use of those appliances was essential and/or difficult to reduce or modify. Almost all respondents mentioned regular use of television or entertainment devices, chargers and phones, and internet devices. Of these, chargers and phones were reported as essential by the largest percent of the respondents with those devices. TVs and Internet devices were reported as essential by a smaller portion of the respondents.

Table 3-18. Interview respondents electronics and other appliances

Electronics and other appliances	Used by household		Indicated use was essential / difficult to reduce	
	Count	Percent	Count	Percent who used device and indicated use was essential
TV and Entertainment Devices	75	97%	23	31%
Computers and Laptops	61	79%	30	49%
Internet devices	71	92%	16	23%
Phones/chargers	73	95%	36	49%
Other appliances	33	43%	4	12%

The following are examples of what respondents reported about device use, the importance of different appliances, and steps taken in the event of a crisis that would limit or prevent their use.

- Electronic devices
  - "Definitely the cell phone and the laptop are essential because I also do my own business… that would virtually shut down my business" - *SCE Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*
  - "My first thought on things that use electric that are essential is the computer. I live on it. I need it for work" - *PG&E Customer, Low usage, CARE Eligible, CEC Inland Climate Zone*
  - "The computer would be a problem to go without, I use it for work. With the computers, I would go in to work, or I could take the laptop and go into a coffee shop. But I believe in order to do that, I would have to bring my desktop into work and log in there. I wouldn't have to stay at work, if I know it was going to be a number of days, I would do that." - *SCE Customer, High usage, Moderate Income, CEC Coastal Climate Zone*
  - "The pandemic really hit my business hard. Nowadays, it is all about technology, so I use my laptop for checking in on work. I wouldn't be able to work without it." - *SDG&E Customer, High usage, CARE Eligible, Medical Baseline, CEC Inland Climate Zone*
  - "With our iPad, we are also ordering medical supplies for my husband's medical conditions, so it's not just used for entertainment." - *SCE Customer, High usage, Moderate Income, CEC Coastal Climate Zone*
  - "If we had an issue, we would probably downsize the screen options, cutting down from two computer screens to one, and then actually unplugging the laptop and running off battery during those heavy peak times." - *SDG&E Customer, Medium usage, FERA Eligible, CEC Coastal Climate Zone*
  -

- Well pump

  – "We have a well pump and we need that all the time. We can't use this less." - *PG&E Customer, Medium usage, CARE Eligible, CEC Coastal Climate Zone*

  – "We have a well pump out in our pasture that runs on electricity. It's out in our pasture and we don't have a generator for it. Without the well, we would be in trouble." - *PG&E Customer, High usage, CARE Eligible, CEC Inland Climate Zone*

- Other items

  – "I have an electric car as well. I charge it in the garage whenever I need it and I would not be able to do that less if my bill became very unaffordable." - *SDG&E Customer, High usage, CARE Eligible, CEC Coastal Climate Zone*

  – "We have a hot tub, but we have stopped using it due to the cost. It was hard to program it to run around the time-of-use thing they have, and it was running a fair amount each month. I miss not being able to use that." - *PG&E Customer, High usage, CARE Eligible, CEC Mountain Climate Zone*

  – "Because we're in time of use, we would structure any heavy electrical usage around the lowest part of the day. So, any dishwashing, clothing washing, would happen in those early morning hours." - *SDG&E Customer, Medium usage, FERA Eligible, CEC Coastal Climate Zone*

  – "I would have advised my children not to turn on the lights, quit using the TV if you're not going to sit in there. Disconnect everything off of the plugs if you're not using it." - *PG&E Customer, High usage, CARE Eligible, CEC Coastal Climate Zone*

  – "I've actually tried to use laundry in the morning, so we're not in those peak hours. We only run it once or twice a week, so we could survive a few days without it." *SDG&E Customer, Medium usage, Moderate Income, CEC Coastal Climate Zone*

  – "My husband uses an electric bike and scooter as a means to go to work." - *PG&E Customer, Low usage, CARE Eligible, CEC Coastal Climate Zone*

<u>Essential use & underutilization findings related to electronics and other appliances</u>

1. Electronic devices were reported as most necessary for work-at-home and children's schoolwork. In addition, households with older residents or residents with medical needs also indicated high importance for maintaining use of electronic devices due to being regularly at home.
2. One of the more frequent areas respondents reported they would make changes to if they faced an affordability crisis was their use of electronic devices. Respondents reported reducing use of entertainment systems, unplugging devices, avoiding peak time periods, and charging devices at other locations.

3. Laundry washers, dryers, and dishwashers were other frequent appliances that respondents indicated they needed on a regular basis for their household. However, many indicated experiences avoiding or limiting use of these appliances due to affordability concerns.
4. The interviews also identified other devices that are less common, but very important for basic household needs. These included well pumps (2 respondents) and vehicle chargers (2 respondents). These respondents reported that usage of these devices is based on need and cannot be changed without significant disruption to their lives.

4 SURVEY FINDINGS SUMMARY

4.1 Survey introduction

The research team was tasked with conducting an EUS Survey to collect quantitative information on electricity usage and medical device use for a sample of households with expected medical needs. The intent of the survey research was to gain a more detailed understanding of this topic as it relates to the essential uses of electricity that could be leveraged in the design of the web tool.

The EUS Survey was designed to ask two groups of residents of households who had completed the 2019 Residential Appliance Saturation Study (2019 RASS) survey a small number of supplemental questions about electricity usage related to medical needs. One group of respondents reside in households on a Medical Baseline rate for electricity. The second group are customers who are not on the Medical Baseline rate but who reported on the 2019 RASS survey that one or more members of their household uses medical equipment in their home and/or that a household member has a medical disability.

The EUS Survey was designed by DNV and APPRISE to document the use of medical devices that require electricity, the extent to which additional heating or cooling is needed to maintain health and well-being of members with medical conditions or needs, and the scope of refrigeration use to store medicine. APPRISE conducted the survey in the summer of 2022 using a mixed-mode approach. A total of 1,139 households completed the survey from sample of 2,000 households invited to participate, with an estimated response rate of 59%.

This summary furnishes information describing the research methodology and highlighting the key findings from the EUS Survey. This section includes the following sections:

- Introduction
- Survey methodology
- Characteristics of survey respondents
- Heating usage for medical needs
- Cooling usage for medical needs
- Medical devices & equipment
- Refrigeration of medicine
- Summary of medical need for electricity usage
- Summary of key findings

Additional detailed information is included in the Appendices:

APPENDIX D– Survey advance letter

APPENDIX E– Survey email example

APPENDIX F– Survey instrument

APPENDIX G– Survey sample information

APPENDIX H – Survey dispositions

4.2 Survey methodology

This section provides an overview of the methodology, design, and implementation approaches used for EUS Survey.

4.2.1 Survey population and sample

Out of the 34,520 2019 RASS respondents that were residing within the three territories of the electric utilities (SCE, PG&E, or SDG&E individually-metered electric customers), 6,908 were identified as potentially eligible for the survey. That is, they reside in a household that indicated using medical equipment or indicated one or more members of their household was permanently disabled when completing the 2019 RASS survey, or utility records indicate that the household currently is on a Medical Baseline rate, has a disability indicator, or uses life support equipment. Of the 6,908 qualifying households, 3,833 (55%) were eligible based on one of the three medical flags from utility data, while 3,075 (45%) were eligible based on one of the two disability flags that are based on responses from the 2019 RASS survey.

Of the initially eligible 6,908 households, 5,632 were identified as eligible to be contacted to participate in the EUS survey. Households were omitted from eligibility for several, typically overlapping reasons. These included being an inactive account (770 households), missing contact information (874 households), missing phone number (888 households), updated contact information showed that the account holder had moved (834 households), updated contact information showed that the account holder was not the RASS respondent (97 households), or the household was listed as do not contact (173 households). Do not contact status was determined both with flags from the utilities and from the EUS Task 2 interviews previously conducted.

The eligible households were explicitly stratified by a cross section of variables of interest:

- Participation in a low-income utility rate program (California Alternative Rates for Energy (CARE)[14] and/or Federal Electric Rates Assistance Program (FERA)[15]) vs Not CARE/FERA) for electric service
- Occupancy type (mix of children/seniors present in the household)
- Collapsed CEC climate zone (mild, inland, desert)
- Participation in Medical Baseline program for electric service

Using these groupings resulted in 40 strata. Strata were sampled at roughly proportional quantities to their percent of the eligible 2019 RASS survey population (around 17%), with known Medical Baseline[16] customers oversampled so that this proportion represents about 50% of the total sample (versus 34% in the qualifying population). This was done to ensure at least half of the sample would be using medical equipment that may have some impact on their energy consumption.

The survey was also designed to explore whether there is incremental heating and cooling load associated with the presence of individuals with medical needs in households that may not be on Medical Baseline rates but had indicated they use medical equipment. The sample approach ensured that about half of the sample included non-Medical Baseline households, with these households likely to include medical usage needs (1,341 of the 2019 RASS respondents not on Medical Baseline indicated using electrical medical equipment within the household during the RASS survey).

In addition to Medical Baseline, households in the CEC desert climate zone were also oversampled. These households make up a relatively small proportion of the eligible population but may rely more on electricity for cooling. The number of targeted completes for desert was 71 households, versus 52 if they had been sampled proportional to the eligible 2019 RASS survey population.

[14] CARE is a program whereby enrolled low-income customers receive a 30-35 percent discount on their electric bill and a 20 percent discount on their natural gas bill.

[15] Families whose household income slightly exceeds the CARE allowances qualify to receive FERA discounts, which applies a 18% discount on their electricity bill.

[16] The Medical Baseline Program Medical provides customers with qualifying medical conditions an additional allotment of electricity and/or gas every month at the lowest price available on their energy bills.

While capturing a range of electric consumption levels is of interest, it was not included as an explicit stratifying variable. Instead, consumption level was used as an implicit stratification using a systematic random sample within each explicit stratum. Electric provider was also used as an implicit stratification field.

A sample of 2,000 eligible households was selected to be invited to participate in the survey. Based on the sample design, the margin of sampling error for the full sample of respondents is plus or minus 3 percentage points.

4.2.2 Survey design

The EUS Survey was designed as a mixed-mode survey that could be self-administered by respondents via a survey webpage or interviewer-administered by telephone. The survey instrument was created to use language that could be effective if read by respondents themselves or heard aurally over the telephone. The survey instrument included 9 key questions and included skip logic to provide additional follow-up questions when relevant. The instrument included questions on the following topics:

- **Screeners to Confirm Residency** – Does the individual still reside at the address? Did they live there at the time the 2019 RASS was completed?
- **Heating Need for Medical Purposes** – Does the home need to be kept extra warm during the winter or on cold days for medical purposes? If so, what is the scope of this need (area, temperature settings, equipment)? How often can households successfully keep their home as warm as needed?
- **Cooling Need for Medical Purposes** – Does the home need to be kept extra cool during the summer or on hot days for medical purposes? If so, what is the scope of this need (area, temperature settings, equipment)? How often can households successfully keep their home as cool as needed?
- **Medical Devices Used and Frequency of Use** – Do individuals in the household use any medical devices or equipment? If so, what types of equipment are used, and how frequently?
- **Use of Refrigeration to Store Medicine** – Does anyone in the home need to keep medicine at a controlled, refrigerated temperature? If so, is the main refrigerator used or is a secondary refrigerator used?
- **Changes since 2019 RASS** – Has the total use of electricity for medical reasons changed since 2019?
- **Household Demographic Characteristics** – How many total members are in the household by age group (children, non-senior adults, seniors)? What is the approximate household income level?

4.2.3 Survey implementation

APPRISE staff pretested the survey by telephone with a small number of clients in early June of 2022. No substantive changes were made to the instrument based on pretest results.

To conduct the survey, APPRISE used a push-to-web approach designed to maximize response rates and sample representativeness within the budgeted scope for the research activity. The push-to-web approach included four steps:

Advance letter mailing – Each household selected for the survey was mailed a letter inviting them to participate by completing the survey online or by calling APPRISE's toll-free telephone number. The survey letter was mailed on utility letterhead and in utility envelopes, and the envelope included a $5 bill. The letter was signed by a utility representative and included contact information to verify study legitimacy. Each letter included both a general survey link and QR code (an array of black and white squares readable by the camera on a smartphone linking to the survey) with a unique access code for each household. APPRISE mailed letters in mid- to late-June.

Email reminders – Approximately 79% of sampled customers had an email address included in the utility data. In early July, APPRISE sent initial reminder emails to households with available email addresses that had not yet competed the

survey. The emails included the same content included in the advance mailing and included the utility logos. In late July, APPRISE sent final reminder emails to households in targeted strata that had yet responded. The final email emphasized the survey would be closing soon and encouraged participation.

Phone outreach and assistance – APPRISE responded to in-bound calls regarding the survey. In July and early August, APPRISE interviewers conducted outbound telephone calling and interviewing. APPRISE interviewers were assigned groups of cases and called households between 9 AM and 9 PM Pacific Time, making multiple attempts at varying times of day and on different days. APPRISE called each respondent up to seven times to attempt to reach them, leaving voicemail messages on every other attempt. In total, five trained APPRISE staff conducted survey interviewing for the survey.

The survey was conducted using Qualtrics, a web-based survey platform. Respondents that participated by web accessed the survey using a general survey website URL and entering their unique Access Code. APPRISE interviewers used the same approach to conduct interviews with respondents over the phone.

Survey interviews were conducted in English and Spanish and were completed between June 9 and August 19, 2022. Interviews were completed with a total of 1,139 households, representing 57% completion rate. The estimated response rate after accounting for ineligible households is 59 percent. Among those who completed the survey, 45 percent completed online via a computer or laptop, 29 percent completed online via a smartphone or small device, and 26 percent completed by telephone. The average interview length was approximately 6 minutes.

4.3 Survey analysis

APPRISE staff reviewed the survey data and conducted coding for “other” responses and verbatim responses to identify common responses. Following coding, the data were processed for final analysis. APPRISE analyzed results by mode and confirmed that differences were generally small and related to respondent characteristics.

The objective of the sampling approach was to identify respondents that were likely to have medically-related needs for electricity based on their responses to the 2019 RASS survey and are therefore not a representative sample of California utility households. The estimates presented are weighted to provide results that are representative of the target population of PG&E, SCE, and SDG&E customers who completed the 2019 RASS and were likely to have medical needs based on information provided by the utilities and self-reported on RASS. Survey weights were developed based the probability of selection for each survey respondent and the relative response for each targeted survey stratum.

The survey statistics presented in this report include estimates calculated for the sample and subgroups of respondents that answered specific survey questions or who had specific characteristics. As a result, the number of survey respondents used to calculate the estimates varies. When comparing differences in survey estimates across subgroup, caution should be used in determining if differences are significant and meaningful due to the margin of error around each estimate. In general, results that differ by ten percentage points or more are statistically significantly different.

4.3.1 Characteristics of survey respondents

It is important for responding households to the survey to be similar in composition to the full group of households sampled and invited to participate in the survey. Table 4-1 compares the composition of households that completed the survey to the full sample on several key characteristics. Overall, the results show that the final respondents closely match the full sample with minor variations (five or less percentage point differences).

Table 4-1. Comparison of survey respondents to full sample[17]

Characteristic	Survey respondents	Full sample
CEC climate region	52% Inland 42% Mild 6% Desert	52% Inland 41% Mild 7% Desert
Utility customer	51% PG&E 35% SCE 14% SDG&E	49% PG&E 37% SCE 14% SDG&E
Medical Baseline enrollment	53% Enrolled 47% Not	49% Enrolled 51% Not
Eligible for or currently enrolled in CARE/FERA	39% CARE/FERA 61% Not	44% CARE/FERA 66% Not
Household type (based on RASS)	26% Non-Senior/Child 74% with Senior or Child	25% Non-Senior Child 75% with Senior or Child
Annual electricity consumption (2019)	31% Low 50% Moderate 19% High	34% Low 49% Moderate 17% High

The following tables present additional information on the characteristics of households that completed the EUS survey.[18] Overall, the survey respondents varied in household composition, with 21 percent having no seniors or children in the household, 23 percent with seniors and non-senior adults, 13 percent with children, and 43 percent with seniors only. About half of respondents are Low- and Moderate-Income (LMI) and half are non-LMI. Reflective of the broader population, the most common housing type is single family detached homes (73%) and the most common primary heating fuel is natural gas (67%), with a smaller portion using electricity for heating (18%).

[17] The Table 4-1percentages are based on the sample characteristics derived from the 2019 RASS and utility data. The survey respondent results are unweighted for direct comparison to the full sample. Electricity consumption is defined as low if 5,000 kWh or less, moderate if 5,001 to 10,000 kWh, and high if about 10,000 kWh.

[18] Table 4-2to Table 4-5present unweighted results. Table 4-2and Table 4-3are based on information respondents reported in the EUS Survey on household members and household income. Information from the 2019 RASS and utility data was used for about 18 percent of respondents who did not report income or household member information. Table 4-4and Table 4-5are based on information from the 2019 RASS and utility data.

Table 4-2. Household type of survey respondents

Household type	Count	Percent
Household includes child	144	13%
Non-senior & senior adults	266	23%
Non-senior adults only	239	21%
Seniors only	490	43%
Total	**1,139**	**100%**

Table 4-3. Income group of survey respondents

Income group	Count	Percent
CARE / FERA eligible	356	31%
Moderate Income	193	17%
Non-LMI	590	52%
Total	**1,139**	**100%**

Table 4-4. Housing type of survey respondents

Housing type	Count	Percent
Single family detached	829	73%
Other (attached single family, multifamily, mobile home, etc.)	310	27%
Total	**1,139**	**100%**

Table 4-5. Primary heating fuel type of survey respondents

Heating fuel type	Count	Percent
Electric	203	18%
Natural gas	768	67%
Delivered / other	168	15%
Total	**1,139**	**100%**

4.4 Survey findings for heating usage for medical needs

The EUS Survey asked respondents if anyone in the household had a medical need where it was important to keep areas in the home extra warm in the winter or on cold days to maintain that person's health and well-being. While many households do not use electricity as their primary heating source or may have limited cold days, electricity is used to support non-primary heating equipment and to provide supplemental space heating. As shown in Table 4-6, 40% of respondents reported that extra warmth in their home was important due to a medical condition. Comparing households enrolled in Medical Baseline and those not enrolled in Medical Baseline, half of the respondents of Medical Baseline households reported needing extra warmth to maintain health and well-being, while only about one third of the respondents from non-Medical Baseline households indicated a need for additional warmth.

Table 4-6. Need for extra warmth due to medical condition by survey respondents

Need for extra warmth	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Needs extra warmth	40%	50%	34%
Does not need extra warmth	60%	50%	66%

Table 4-7 to Table 4-8 show the same information for key subgroups. The tables show that the portion of respondents that indicated needing extra warmth varied notably based on some key characteristics but was similar across different groups for other characteristics:

Region – The results by region were similar, indicating the medical need for extra warmth is not associated only with certain climate areas.

Income group – There were large differences by income group. A total of 52% of CARE/FERA eligible households indicated a need for extra warmth for medical reasons compared to 40% of moderate-income households and 29% of non-LMI households.

Household type – Respondents residing in households with a mix of senior and non-senior adults and in households with children were the most likely to report needing extra warmth (55% and 48%, respectively). A smaller portion of respondents residing in households without children or seniors and respondents from households with only seniors indicated needing additional warmth (32% each).

Table 4-7. Need for extra warmth due to medical condition by survey respondents – by region

Need for extra warmth	Mild	Inland	Desert
Needs extra warmth	38%	41%	37%
Does not need extra warmth	62%	59%	63%

Table 4-8. Need for Extra Warmth Due to Medical Condition by survey respondents – By Income Group

Need for extra warmth	CARE/FERA	Moderate Income	Not LMI
Needs extra warmth	52%	40%	29%
Does not need extra warmth	48%	60%	71%

Table 4-9. Need for extra warmth due to medical condition by survey respondents – by household type

Need for extra warmth	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Needs extra warmth	32%	48%	55%	32%
Does not need extra warmth	68%	52%	45%	68%

Respondents who indicated a need for additional warmth were asked a series of questions to understand the extent of this need, their ability to meet this need, and the impact that the need has on their use of heating during the winter or on cold days.

First, respondents were asked if the entire home or most of the home required extra warmth, or if only specific areas or rooms needed to be kept extra warm. Table 4-10 displays the results, showing that 60% of respondents reported needing extra warmth in most or all of their home and 40% reported needing this in limited areas of their home. Results were similar for household enrolled and not enrolled in Medical Baseline.

Table 4-10. Area of home requiring extra warmth by survey respondents

Home area	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Entire home / most of home	60%	61%	59%
Specific rooms / limited areas	40%	39%	41%

Table 4-11 and Table 4-12 below show the results by subgroup:

- **Region** – Almost 70% of respondents in households requiring extra warmth in the desert region reported needing this for most or all of their home, while closer to half of respondents in the mild region reported this need for most of the home as compared to more limited areas of the home.

- **Income group** – About two-thirds (65%) of respondents from households on CARE/FERA rate plans required extra warmth throughout their entire home, which was about ten percentage points higher than for respondents from

moderate-income and non-LMI households. This may be related to lower-income households generally residing in smaller homes and having reduced ability to control or limit heating in specific spaces.

- **Household type** – – Respondents from the desert areas, generally associated with greater heating loads in winter, were more likely to report requiring extra warmth compared to those residing in milder climate zones.

Table 4-11. Area of home requiring extra warmth by survey respondents – by region

Home area	Mild	Inland	Desert
Entire home / most of home	54%	62%	71%
Specific rooms / limited areas	46%	38%	29%

Table 4-12 - Area of home requiring extra warmth by survey respondents – by income group

Home Area	CARE/FERA	Moderate Income	Not LMI
Entire home / most of home	65%	55%	54%
Specific rooms / limited areas	35%	45%	46%

Table 4-13. Area of home requiring extra warmth by survey respondents – by household type

Home area	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Entire home / most of home	56%	58%	61%	61%
Specific rooms / limited areas	44%	42%	39%	39%

Respondents were asked about the types of equipment or devices used to provide additional warmth. Table 4-14 shows that the majority of respondents report the use of their main heating system (78%) while a relatively smaller portion report using portable space heaters (44%), heated clothing/blankets (37%), fireplaces or wood stoves (21%), or ceiling fans to push warm air down (23%).[19] These results did not vary appreciably by region, income group, or household type (see Table 4-15 to Table 4-17

[19] Respondents could select more than one equipment type. Therefore, percentages do not add to 100 percent.

Table 4-14. Heating equipment used to provide extra warmth by survey respondents

Heating equipment used	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Main heating system	78%	80%	76%
Portable space heater(s)	44%	41%	46%
Heated clothing/blankets	37%	38%	37%
Fireplace or wood stove	21%	21%	22%
Ceiling fans to push warm air down	23%	27%	20%

Table 4-15. Heating equipment used to provide extra warmth – by region

Heating equipment used	Mild	Inland	Desert
Main heating system	72%	83%	69%
Portable space heater(s)	51%	38%	43%
Heated clothing/blankets	36%	38%	48%
Fireplace or wood stove	22%	18%	48%
Ceiling Fans to push warm air down	18%	25%	42%

Table 4-16. Heating equipment used to provide extra warmth – by income group

Heating equipment used	CARE/FERA	Moderate Income	Not LMI
Main heating system	72%	80%	86%
Portable space heater(s)	45%	50%	38%
Heated clothing/blankets	41%	36%	33%
Fireplace or wood stove	15%	21%	31%
Ceiling fans to push warm air down	17%	25%	31%

Table 4-17. Heating equipment used to provide extra warmth – by household type

Heating equipment used	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Main heating system	73%	71%	79%	83%
Portable space heater(s)	46%	57%	44%	35%
Heated clothing/blankets	35%	40%	42%	33%
Fireplace or wood stove	14%	23%	28%	18%
Ceiling Fans to push warm air down	19%	22%	25%	24%

Respondents were asked about the average daytime thermostat setting in the winter. Table 4-18 shows the results split by respondents with and without additional heating needs for medical reasons and the difference between the groups reporting each thermostat temperature range. Positive values in the "difference" column indicate the proportion of respondents that report needing additional warmth that reported that daytime thermostat set point range as compared to the respondents in households reporting that they don't require extra warmth. Overall, the largest portion of the respondents needing extra warmth reported thermostat set-point ranges between 71 and 80 degrees Fahrenheit.

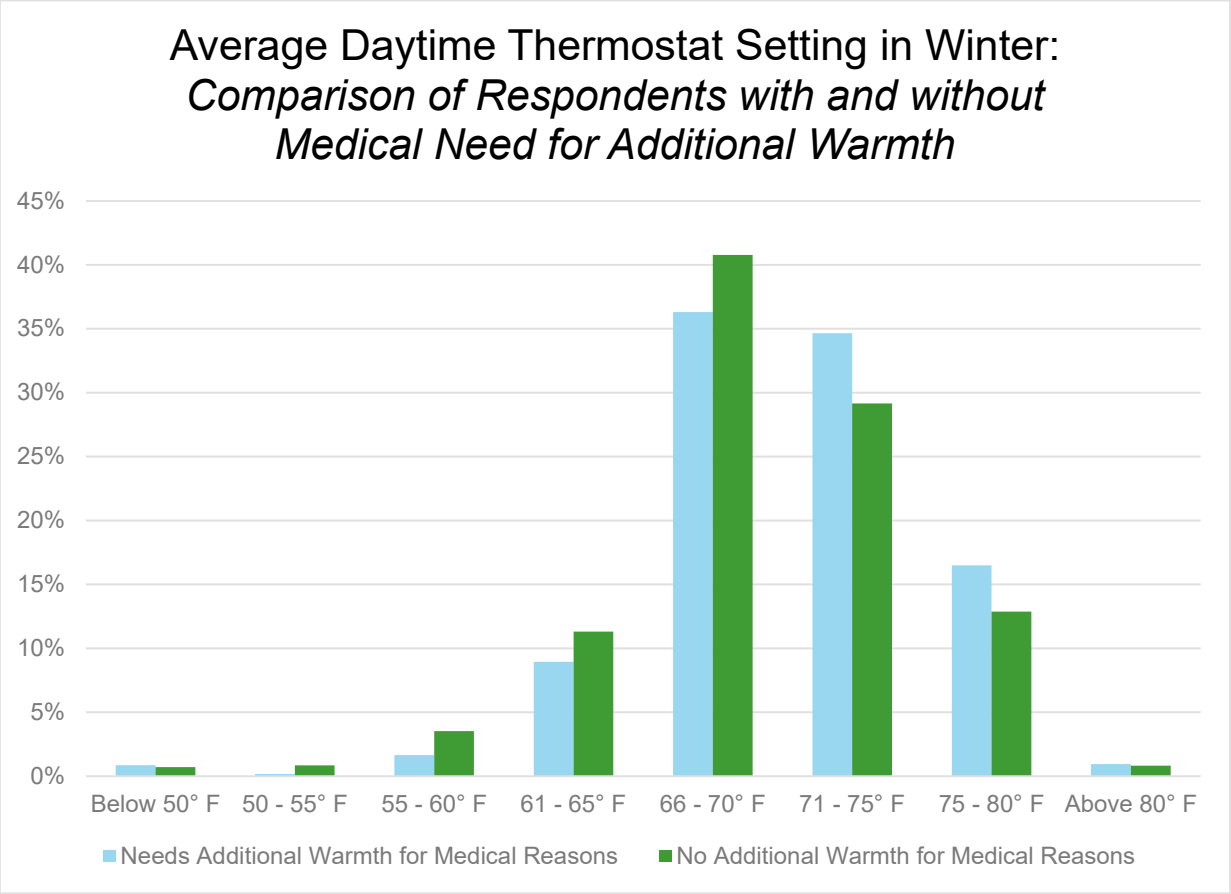
Table 4-18. Average daytime thermostat setting in winter - comparison of households who need and do not need additional warmth for medical reasons[20]

Daytime thermostat set point	Needs additional warmth	Does not need additional Warmth	Difference
Below 50° F	1%	1%	0%
50 – 54° F	0%	1%	-1%
55 – 60° F	2%	4%	-2%
61 – 65° F	9%	11%	-2%
66 – 70° F	36%	41%	-4%
71 – 75° F	35%	29%	+5%
76 – 80° F	16%	13%	+4%
Above 80° F	1%	1%	0%

[20] Table 4.4 excludes 14% of households who reported they have a simple on/off switch without a thermostat temperature setting.

The figure below presents the same information in a chart. A larger portion of respondents from households without a need for additional warmth (green bars) set their thermostat at lower daytime temperatures at or below 70 degrees, while more respondents from households with a need for extra warmth (blue bars) set their thermostats above 70 degrees.

Figure 4-1. Average daytime thermostat setting in winter: comparison of respondents with and without medical needs for additional warmth



Respondents in households with extra heating needs were asked to estimate how much warmer their home was kept compared to if there was not a medical need requiring extra warmth. As displayed in Table 4-19, about two-thirds of respondents indicated their homes were kept at higher temperatures in the winter than they would be without a medical need, while one-third indicated the home was no warmer than it would be without medical needs (perhaps due to preferential reasons or difficulty conceptualizing the hypothetical scenario). The range or temperature differences reported was notable – with 31% reporting they kept their daytime setting five or more degrees higher due to medical concerns.

Table 4-19. Amount higher that temperature is set for medical reasons

Amount warmer due to medical need	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
No warmer (would keep the same without medical needs)	35%	36%	35%
1 - 2° warmer	14%	13%	16%
3 - 4° warmer	19%	22%	17%
5 - 6° warmer	21%	19%	23%
7° or more warmer	10%	10%	10%

While households may need extra warmth for individuals with medical needs, that does not mean that all households are able to maintain the needed warmth levels due to affordability challenges or other reasons. The survey asked respondents how frequently they can keep their home or areas in their home as warm as needed on cold days or seasons for health and well-being. Table 4-20 shows the results. *Overall, 41% reported they are always able to keep their home as warm as needed, while about 59% reported lower frequencies that may indicate underutilization of heating.* Respondents from Medical Baseline households were more likely to report they could always maintain the needed warmth (50%) compared to respondents from non-Medical Baseline households (34%). This result may be related to Medical Baseline households having more substantial medical needs, having greater ability to afford heating costs due to the Medical Baseline electricity discount, or a combination of these factors.

Table 4-20. Ability to keep home as warm as needed

Ability to keep home as warm as needed	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Never	1%	1%	2%
Rarely (a few days during the season)	5%	5%	5%
Sometimes (a few times a month)	20%	16%	23%
Often (a few days a week)	33%	29%	36%
Always (every day)	41%	49%	34%

Table 4-21. Ability to keep home as warm as needed – by region

Ability to keep home as warm as needed	Mild	Inland	Desert
Never	1%	2%	1%
Rarely (a few days during the season)	7%	4%	1%
Sometimes (a few times a month)	14%	24%	23%
Often (a few days a week)	38%	30%	30%
Always (every day)	41%	40%	44%

Table 4-22. Ability to keep home as warm as needed – by income group

Ability to keep home as warm as needed	CARE/FERA	Moderate Income	Not LMI
Never	1%	1%	2%
Rarely (a few days during the season)	6%	5%	4%
Sometimes (a few times a month)	24%	18%	14%
Often (a few days a week)	33%	26%	36%
Always (every day)	36%	49%	43%

Table 4-23. Ability to keep home as warm as needed – by household type

Ability to keep home as warm as needed	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Never	0%	4%	1%	1%
Rarely (a few days during the season)	5%	7%	4%	4%
Sometimes (a few times a month)	31%	14%	20%	17%
Often (a few days a week)	29%	40%	39%	26%
Always (every day)	35%	35%	36%	52%

4.5 Survey findings for cooling usage for medical needs

To understand essential need for cooling, the EUS Survey asked respondents if anyone in the household had a medical need where it was important to keep areas in the home extra cool in the summer or on hot days to maintain that person's health and well-being. As shown in Table 4-24, 35% of respondents reported that extra cooling in their home was important due to a medical condition. Comparing respondents from households enrolled in Medical Baseline and those from households not enrolled in Medical Baseline, 44% of Medical Baseline households need extra cooling to maintain health and well-being, while only 30% of the respondents in non-Medical Baseline households indicated a need for additional cooling.

Table 4-24. Need for extra cooling due to medical condition

Need for extra cooling	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Needs extra cooling	35%	44%	30%
Does not need extra cooling	65%	56%	70%

Table 4-25 to Table 4-27 show the same information for key subgroups.

- **Region** – The need for additional cooling for medical reasons was about 40% in both the inland and desert regions, compared to only 28% in the mild region.

- **Income group** – As with heating need, there were large differences by income group. Almost half (46%) of respondents from households with income levels eligible for CARE/FERA indicated a need for extra cooling for medical reasons compared to 37% of respondents from moderate-income households and 26% of respondents from non-LMI households.

- **Household type** – Households with a mix of senior and non-senior adults and households with children had the largest portion of households needing extra cooling (46% and 40%, respectively). A total of 36% of respondents from households without children or seniors reported this need, and only 27% of respondents from senior households indicated needing extra cooling for medical reasons.

Table 4-25. Need for extra cooling due to medical condition – by region

Need for extra cooling	Mild	Inland	Desert
Needs extra cooling	28%	40%	41%
Does not need extra cooling	72%	60%	59%

Table 4-26. Need for extra cooling due to medical condition – by income group

Need for extra cooling	CARE/FERA	Moderate Income	Not LMI
Needs extra cooling	46%	37%	26%
Does not need extra cooling	54%	63%	74%

Table 4-27. Need for extra cooling due to medical condition – by household type

Need for extra cooling	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Needs extra cooling	36%	40%	46%	27%
Does not need extra cooling	64%	60%	54%	73%

Respondents who indicated a need for additional cooling were asked questions to understand the extent of this need, the impact that the need has on their use of cooling during the summer or on hot days, and their ability to meet this need. First, respondents were asked if the entire home or most of the home required extra cooling, or if only specific areas or rooms needed this. Table 4-28 displays the results, showing that 62% of respondents reporting that their households need extra cooling in most or all of their home and 38% report this need in limited areas of their home. Two-thirds 66% of respondents from non-Medical Baseline households reported needing to cool their whole home compared to 58% of respondents from Medical Baseline households.

Table 4-28. Area of home requiring extra cooling

Home area	All Households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Entire home	62%	58%	66%
Specific Rooms/limited areas	38%	42%	34%

Table 4-29 to Table 4-31 below show the results by subgroup:

- **Region** – There were limited differences by region. A majority of households in all three regions needed extra cooling for the entire home.

- **Income group** – About two-thirds of respondents from CARE/FERA households (68%) and moderate-income households (66%) required extra cooling throughout their entire home, which was about 15 percentage points higher than for respondents from non-LMI households. This may be related to housing characteristics and cooling system or device type.

- **Household type** – Results were similar for households with different compositions, with the exception being that more respondents from senior only households reported using extra cooling in limited areas only.

Table 4-29. Area of home requiring extra cooling – by region

Home area	Mild	Inland	Desert
Entire home	54%	67%	63%
Specific rooms/limited areas	46%	34%	37%

Table 4-30. Area of home requiring extra cooling – by income group

Home area	CARE/FERA	Moderate Income	Not LMI
Entire home	68%	66%	51%
Specific rooms/limited areas	32%	34%	49%

Table 4-31. Area of home requiring extra cooling – by household type

Home area	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Entire home	66%	65%	62%	58%
Specific rooms/limited areas	34%	35%	38%	42%

Table 4-32 shows that 60% of households use central cooling, about 60% use standing fans, about 50% use ceiling fans, 27% use room or window units, and 15 % reported using other equipment.[21]

Table 4-32. Cooling equipment used to provide extra cooling

Cooling equipment used	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Central cooling system	60%	63%	58%
Room or window AC	27%	28%	26%
Ceiling fans to pull warm air up	49%	52%	46%

[21] Respondents could select more than one equipment type. Therefore, percentages do not add to 100 percent. Other equipment includes swamp or evaporative coolers, portable ACs, and cooling techniques that may not use electricity.

Cooling equipment used	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Fans	61%	58%	63%
Other (write-in)	15%	11%	18%

Table 4-33. Cooling equipment used to provide extra cooling – by region

Cooling equipment used	Mild	Inland	Desert
Central cooling system	32%	74%	74%
Room or window AC	34%	23%	31%
Ceiling fans to pull warm air up	44%	51%	49%
Fans	70%	54%	70%
Other (write-in)	18%	12%	27%

Table 4-34. Cooling equipment used to provide extra cooling – by income group

Cooling equipment used	CARE/FERA	Moderate Income	Not LMI
Central cooling system	50%	58%	75%
Room or Window AC	27%	34%	24%
Ceiling fans to pull warm air up	49%	46%	51%
Fans	64%	58%	57%
Other (write-in)	18%	9%	13%

Table 4-35. Cooling equipment used to provide extra cooling – by household type

Cooling equipment used	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Central cooling system	57%	59%	60%	63%
Room or Window AC	30%	28%	26%	26%
Ceiling fans to pull warm air up	41%	62%	51%	45%
Fans	71%	63%	64%	47%
Other (write-in)	14%	16%	18%	12%

The survey asked respondents with and without extra cooling needs to report average daytime thermostat setting in the summer. Table 4-36 shows the results and the difference by each thermostat temperature range, with positive values indicating a higher portion of respondents needing cooling reported that range compared to the household not requiring extra cooling. Overall, a larger portion of the households needing extra cooling reported thermostat set-point ranges below 74 degrees Fahrenheit with 70 to 73 degrees being the most frequently reported range.

Table 4-36. Average daytime thermostat setting in summer - comparison of households who need and do not need additional cooling for medical reasons

Daytime thermostat set point	Needs additional cooling	Does not need additional Cooling	Difference
Below 65° F	4%	7%	-3%
65 - 67° F	6%	3%	+3%
68 - 69° F	12%	6%	+6%
70 - 73° F	28%	15%	+13%
74 - 76° F	25%	27%	-3%
77 - 80° F	24%	37%	-13%
81 - 85° F	2%	5%	-3%
Over 85	0%	1%	-1%

The next figure presents the same information in a chart. A larger portion of households without a need for additional cooling (green bars) set their thermostat at higher daytime temperatures at or above 74 degrees, while more households with a need for extra warmth (blue bars) set their thermostats below 74 degrees.

Figure 4-2. Average daytime thermostat setting in summer: comparison of respondents with and without medical needs for additional cooling

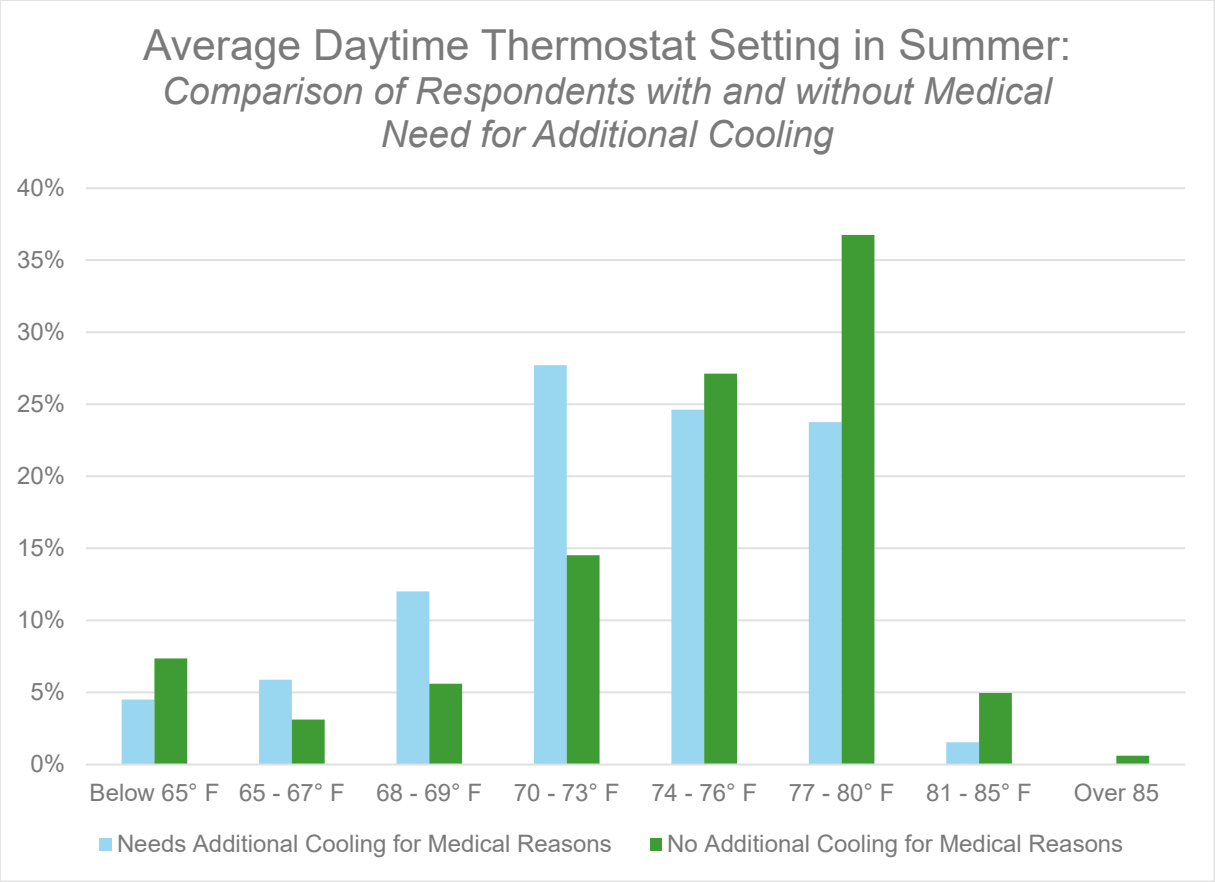


Table 4-37 shows how respondents living in households with extra cooling needs estimated how much cooler their home was kept as compared to households where respondents did not indicate a medical need requiring extra cooling. About two-thirds (64%) of the respondents indicated that their homes were kept at lower temperatures in the summer than they would be without a medical need. Of those respondents, about one in four (26%) reported that they kept their daytime setting five or more degrees lower due to medical concerns.

Table 4-37. Amount lower that temperature is set for medical reasons

Amount cooler due to medical need	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
No Cooler (Would Keep the Same without Medical Needs)	38%	35%	41%

Amount cooler due to medical need	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
1 - 2° cooler	15%	14%	16%
3 - 4° cooler	23%	24%	22%
5 - 6° cooler	16%	17%	14%
7° or more cooler	10%	10%	8%

Table 4-38 *shows that about one-third (36%) of respondents indicate that they always keep their homes as cool as needed in the summer, a third (32%) can do this often, and about a third (30%) can do this occasionally*. A relatively few respondents (3%) reported never being able to do this. Having a total of about 65% of respondents reporting lower frequencies may indicate underutilization of cooling. Respondents from Medical Baseline households were more likely to report they could always maintain the needed cooling (43%) as compared to those from non-Medical Baseline households (30%). Responses were similar for respondents in different regions (Table 4-39), income groups (Table 4-40), and household type (Table 4-41).

Table 4-38. Ability to keep home as cool as needed

Ability to keep home as cool as needed	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Never	3%	3%	3%
Rarely (a few days during the season)	10%	9%	12%
Sometimes (a few times a month)	20%	20%	19%
Often (a few days a week)	32%	25%	37%
Always (every day)	36%	43%	30%

Table 4-39. Ability to keep home as cool as needed – by region

Ability to keep home as cool as needed	Mild	Inland	Desert
Never	3%	3%	0%
Rarely (a few days during the season)	18%	7%	4%

Ability to keep home as cool as needed	Mild	Inland	Desert
Sometimes (a few times a month)	18%	20%	23%
Often (a few days a week)	28%	33%	33%
Always (every day)	33%	37%	40%

Table 4-40. Ability to keep home as cool as needed – by income group

Ability to keep home as cool as needed	CARE/FERA	Moderate Income	Not LMI
Never	3%	5%	2%
Rarely (a few days during the season)	8%	15%	11%
Sometimes (a few times a month)	24%	16%	15%
Often (a few days a week)	31%	25%	35%
Always (every day)	34%	40%	37%

Table 4-41. Ability to keep home as cool as needed – by household type

Ability to keep home as warm as needed	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Never	2%	3%	1%	6%
Rarely (a few days during the season)	12%	11%	14%	5%
Sometimes (a few times a month)	34%	16%	18%	13%
Often (a few days a week)	26%	35%	35%	29%
Always (every day)	26%	35%	33%	46%

4.6 Survey findings for medical devices and equipment

This section presents results from the EUS survey on the use of different medical devices. Respondents were asked if any members of the household have a medical or health condition that requires the use of one or more medical devices or

assistive equipment that need to be plugged-in to use or charge, such as equipment or machines recommended by a doctor, or which assist with mobility. Table 4-42 shows that about half (54%} of respondents indicated use of a medical device in their households. Respondents from Medical Baseline households are more likely (77%) to have medical devices than non-Medical Baseline households (40%).

Table 4-42. One or more medical devices used in home

Medical device use by household members	All households	Enrolled in Medical Baseline	Not enrolled in Medical Baseline
Household Uses 1+ Devices	54%	77%	40%
Household Does Not Use Devices	46%	23%	60%

Table 4-43 to Table 4-45 below show the results split by subgroup:

- **Region** – There were no significant differences by region.
- **Income group** – About half of the respondents from LMI households reported medical device use compared to 60% of respondents from non-LMI households.
- **Household type** – Results were similar for most household types, except that households with both senior and non-senior members were more likely to report device use (61%).
- **Electric Usage Level** – The portion of households using medical devices was lowest for the low usage group (45%) and highest for the high usage group (65%).

Table 4-43. One or more medical devices used in home – by region

Medical device use by household members	Mild	Inland	Desert
Household Uses 1+ Devices	54%	54%	53%
Household does not use devices	46%	46%	47%

Table 4-44. One or more medical devices used in home – by income group

Medical device use by household members	CARE/FERA	Moderate Income	Not LMI
Household Uses 1+ Devices	47%	51%	60%
Household Does Not Use Devices	53%	49%	40%

Table 4-45. One or more medical devices used in home – by household type

Medical device use by household members	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Household Uses 1+ Devices	51%	55%	61%	51%
Household does not use devices	49%	45%	39%	49%

Table 4-46 – One or more medical devices used in home – by Electric Usage Level

Medical device use by household members	Low	Moderate	High
Household Uses 1+ Devices	45%	55%	65%
Household does not use devices	55%	45%	35%

Table 4-47 shows the total percent of respondents reporting each medical device category. Note that respondents could indicate multiple categories of medical devices, so these results do not add to 100%. Breathing support devices were the most commonly reported medical device type, with 44% of the respondents reporting use of these devices. A whole 13 percent reported air purification or moisture control devices, and 11% reported using an electric adjustable bed or chair. All other categories of medical devices were reported by a small share of the survey participants.

Table 4-47. Percent of respondents reporting the use of different medical devices at home

Medical device type	Percent of respondents reporting
Breathing support device	44%
Air purification, circulation, or moisture-control device	13%
Electric adjustable bed or chair	11%
Health monitoring device	6%
Electric wheelchair, cart or stairlift	5%
Electric nerve stimulator	3%
Eating equipment or suction machine	2%

Medical device type	Percent of respondents reporting
Pressure pad or pump	1%
Dialysis machine	<1%
Other device (respondent write-in)[22]	5%

Table 4-48 presents information on the proportion of respondents reporting multiple distinct medical device types in use within their households. Of the respondents that reported a medical device being used, most (61%) reported one device category. Respondents from households on Medical Baseline were more likely to report having multiple devices in use. However, more than 20% of those from non-Medical Baseline households reported having medical device from multiple categories in use.

Table 4-48. Number of medical device types reported

Medical device type	Total	On Medical Baseline	Not on Medical Baseline
None	47%	23%	61%
One	30%	45%	21%
Two	14%	19%	12%
Three	5%	8%	4%
Four	2%	4%	1%
Five or more	1%	2%	1%

Table 4-49 shows the detailed results for respondents who reported breathing support devices.

Table 4-49 – Breathing support devices

Breathing support devices	Total	On Medical Baseline	Not on Medical Baseline
Percent reporting use	44%	69%	29%
Frequency of use (typical week)			
Never	1%	1%	0%

[22] Other responses generally were disparate equipment types. Other responses were reviewed and coded to appropriate categories when applicable.

Breathing support devices	Total	On Medical Baseline	Not on Medical Baseline
Rarely	5%	3%	8%
Sometimes	1%	2%	1%
Often	4%	3%	6%
Always	89%	91%	85%
Hours of use (typical day)			
Less than 1 hour	5%	4%	6%
1 to 8 hours	44%	41%	49%
9 to 16 hours	20%	22%	17%
17 to 24 hours	31%	33%	28%

Table 4-50 shows the detailed results for respondents who reported using air purification, circulation, or moisture-control devices for medical reasons in their households.

Table 4-50.Air purification, circulation, or moisture-control devices

Air Purification	Total	On Medical Baseline	Not on Medical Baseline
Percent reporting use	13%	17%	10%
Frequency of use (typical week)			
Never	<1%	1%	0%
Rarely	8%	7%	9%
Sometimes	11%	12%	9%
Often	14%	9%	19%
Always	67%	71%	62%
Hours of use (typical day)			
Less than 1 hour	2%	2%	3%
1 to 8 hours	31%	22%	40%

Air Purification	Total	On Medical Baseline	Not on Medical Baseline
9 to 16 hours	16%	21%	12%
17 to 24 hours	50%	55%	45%

Table 4-51 shows the detailed results for respondents who reported using electric adjustable beds or chairs for medical reasons in their households.

Table 4-51. Electric adjustable bed or chair

Electric adjustable bed or chair	Total	On Medical Baseline	Not on Medical Baseline
Percent reporting use	11%	13%	9%
Frequency of Use (Typical Week)			
Never	1%	2%	0%
Rarely	2%	1%	4%
Sometimes	2%	1%	3%
Often	8%	2%	12%
Always	88%	94%	82%
Hours of use (Typical Day)			
Less than 1 hour	10%	13%	7%
1 to 8 hours	24%	17%	31%
9 to 16 hours	10%	7%	12%
17 to 24 hours	56%	63%	50%

Table 4-52 shows the detailed results for respondents who reported using health monitoring devices that require electricity or charging within their households.

Table 4-52 – Health monitoring devices

Health monitoring device	Total	On Medical Baseline	Not on Medical Baseline
Percent reporting use	6%	8%	5%
Frequency of use (typical week)			
Never	0%	0%	0%
Rarely	7%	3%	11%
Sometimes	23%	21%	25%
Often	5%	0%	10%
Always	64%	76%	54%
Hours of Use (Typical Day)			
Less than 1 hour	19%	12%	25%
1 to 8 hours	30%	20%	40%
9 to 16 hours	9%	7%	10%
17 to 24 hours	42%	62%	25%

Table 4-53 shows the summary results for the low incidence device types that a small number of respondents reported the use of within their households. The results should be viewed with caution since they are based on a small number of respondents (less than 50).

Table 4-53. Medical devices with low incidence

Device type	Electric wheelchairs, carts, or stairlifts	Electric nerve stimulator	Eating equipment or suction machine	Pressure pad or pump	Dialysis machine
Percent reporting use	5%	3%	2%	1%	<1%
Frequency of Use (Typical Week)					
Never	0%	0%	0%	0%	0%
Rarely	15%	31%	11%	1%	8%

Device type	Electric wheelchairs, carts, or stairlifts	Electric nerve stimulator	Eating equipment or suction machine	Pressure pad or pump	Dialysis machine
Sometimes	18%	23%	29%	0%	10%
Often	14%	23%	4%	10%	6%
Always	54%	23%	56%	89%	76%
Hours of use (typical day)					
Less than 1 hour	1%	32%	7%	5%	8%
1 to 8 hours	66%	60%	56%	45%	10%
9 to 16 hours	16%	3%	6%	8%	66%
17 to 24 hours	18%	8%	31%	42%	16%

4.7 Survey findings for refrigeration of medicine

Based on the In-depth interviews and consultation with stakeholders, the research team determined that it was important to ask about use of refrigeration to store medicine. As shown in Table 4-54, one-third (34%) of respondents reported the need to refrigerate medicine that had to be stored at a controlled temperature. Similarly, one

-third of respondents in both non-Medical Baseline households (32%) and Medical Baseline households (37%) reported the need to refrigerate medicine at home.

Table 4-54 .Use of refrigerator or device to store medicine at controlled temperature

Need for refrigerating medicine	All households	Enrolled in Medical Baseline	Not Enrolled in Medical Baseline
Needs to refrigerate medicine	34%	37%	32%
Does not need to refrigerate medicine	66%	63%	68%

Table 4-55 to Table 4-57 examine the use of refrigerators to store medicine by subgroup.

- **Region** – The results by region had no notable differences with about one third of respondents in each region indicating a need to refrigerate medicine at home.

- **Income group** – A slightly larger share of respondents in moderate-income households reported storing medicine at a controlled temperature (39%) compared to respondents in CARE/FERA households (31%) and respondents in non-LMI households (34%).

- **Household type** – More households with a mix of senior and non-senior adults (42%) store medicine in refrigerators than did households with other compositions (roughly one-third).

- **Usage level** – A whole 30% of the low energy usage group store medicine in a refrigerator, while 40% of the high energy usage group reports doing so.

Table 4-55. Use of refrigerator or device to store medicine at controlled temperature – by region

Need for refrigerating medicine	Mild	Inland	Desert
Needs to refrigerate medicine	33%	35%	32%
Does not need to refrigerate medicine	67%	65%	68%

Table 4-56. Use of refrigerator or device to store medicine at controlled temperature – by income group

Need for Refrigerating Medicine	CARE/FERA	Moderate Income	Not LMI
Needs to refrigerate medicine	31%	39%	34%
Does not need to refrigerate medicine	69%	61%	66%

Table 4-57. Use of refrigerator or device to store medicine at controlled temperature – by household type

Need for Refrigerating Medicine	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Needs to refrigerate medicine	31%	30%	42%	32%
Does not need to refrigerate medicine	69%	70%	59%	68%

Table 4-58. Use of refrigerator or device to store medicine at controlled temperature – by electricity usage level

Need for refrigerating medicine	Low	Moderate	High
Needs to refrigerate medicine	30%	34%	40%
Does not need to refrigerate medicine	69%	61%	66%

Respondents who did report refrigeration of medicine were asked if medicine was stored in the main refrigerator or in a secondary refrigerator or device[23]. Results did not vary appreciably between respondents in households enrolled in Medical Baseline and those not enrolled in Medical Baseline.

Table 4-59. Refrigerator Used for medicine storage

Refrigerator type used	All households	Enrolled in Medical Baseline	Not Enrolled in Medical Baseline
Main refrigerator	87%	84%	88%
Secondary refrigerator / unit	13%	16%	12%

Table 4-60 to Table 4-62 below show the results by subgroup. These results are consistent with the interpretation that secondary refrigerators are associated with higher income groups:

- **Region** – Respondents from all regions have similar results.
- **Income group** – Non-LMI households used secondary refrigeration units at more than double the rate of LMI households (20% compared to about 8%).
- **Household type** – Households with only seniors are more likely to store medicine in their primary refrigerator.
- **Usage level** – Only 2% of low electric usage households use secondary units to store medicine, while 17% of moderate usage households and 20% of high usage households rely on secondary refrigerators for this purpose.

Table 4-60. Refrigerator used for medicine storage – by region

Refrigerator type Used	Mild	Inland	Desert
Main refrigerator	86%	86%	89%
Secondary refrigerator / unit	14%	14%	11%

[23] The survey required respondents to indicate either storing medicine in their main refrigerator or in a secondary unit. A small number of respondents indicated using both depending on need.

Table 4-61 – Refrigerator Used for Medicine Storage – By Income Group

Refrigerator type used	CARE/FERA	Moderate Income	Not LMI
Main refrigerator	92%	93%	80%
Secondary refrigerator / unit	8%	7%	20%

Table 4-62. Refrigerator used for medicine storage – by household type

Refrigerator type used	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Main refrigerator	87%	86%	80%	91%
Secondary refrigerator / unit	13%	14%	20%	9%

Table 4-63. Refrigerator Used for Medicine Storage – By Usage Level

Refrigerator type used	Low	Moderate	High
Main refrigerator	98%	83%	79%
Secondary refrigerator / unit	2%	17%	21%

4.8 Summary of medical need for electricity usage of survey respondents

The EUS Survey asked respondents about four categories of potential medical electricity usage: extra heating, extra cooling, medical devices, or refrigeration from medicine. Table 4-64 shows that three-quarters (76%) of all respondents reported some form of electricity-related usage for medical purposes.[24] As expected, a high majority (92%) of respondents identified from the utility records as enrolled in Medical Baseline did report electricity-related usage for medical purposes, with only 8% reporting no medical usage (potentially due to recent changes in household composition or due to medical needs that the respondent did not associate with any existing category). For non-Medical Baseline households, about two-thirds have a medical need that impacts electricity usage. The remaining one-third of respondents may have members who have medical conditions or permanent disabilities that do not require additional usage of electricity.

[24] It is important to note that the survey did not ask detailed questions about the energy source used for each equipment or device. Particularly for heating, non-electric fuels may be used for help meet extra warmth related to medical needs. While many households do not use electricity as their primary heating source or may have limited cold days, electricity is still used to help support non-primary heating equipment and to provide supplemental space heating.

Table 4-64. Any medical usage need (heating, cooling, medical device, or refrigeration)

Medical usage	All households	Enrolled in Medical Baseline	Not Enrolled in Medical Baseline
Any medical usage reported	76%	92%	67%
No medical usage reported	24%	8%	33%

Table 4-65 to Table 4-67 assess the portion of key subgroups that reported any type of medical usage.

- **Region** – The results by region only varied marginally. Medical needs for electricity do not appear to vary by the location of utility customer.
- **Income group** – The results for respondents from CARE/FERA, moderate-income, and non-LMI households were all similar. Medical needs for electricity do not appear to vary by the participation in income-qualified utility programs.
- **Household type** – More respondents with a mix of senior and non-senior adults reported some medical usage need. This may be related to more household members and households where younger individuals support older household members.
- **Usage level** – A total of 72% of lower usage households, 78% of moderate-income households, and 80% of non-LMI households indicated medical usage needs.

Table 4-65. Any medical usage need (heating, cooling, medical device, or refrigeration)

Medical Usage	Mild	Inland	Desert
Any medical usage reported	73%	79%	73%
No medical usage reported	27%	21%	27%

Table 4-66. Any medical usage need (heating, cooling, medical device, or refrigeration)

Medical Usage	CARE/FERA	Moderate Income	Not LMI
Any medical usage reported	76%	73%	77%
No medical usage reported	24%	28%	23%

Table 4-67. Any medical usage need (heating, cooling, medical device, or refrigeration)

Medical usage	No seniors or children in home	Children in home	Seniors and non-senior adults in home	Only seniors in home
Any Medical Usage Reported	74%	76%	86%	72%
No Medical Usage Reported	25%	24%	14%	28%

Table 4-68. Any medical usage need (heating, cooling, medical device, or refrigeration)

Medical usage	Low	Moderate	High
Any medical usage reported	72%	78%	80%
No medical usage reported	28%	22%	20%

The electricity consumption data available for the EUS Study is based on data from the 2019 RASS, representing consumption in 2019. Since household medical needs may have changed since 2019, the survey asked respondents to characterize if their electricity usage for medical purposes had decreased, stayed the same, or increased since that time. As displayed in Table 4-69, 55% of respondents reported electricity usage for medical purposes remained the same in their households as in 2019, with no change. A total of 37% of respondents reported an increase in medical electric usage, which may be related to growing household medical needs or higher electricity bills. Only 4% of respondents indicated they perceived a reduction in electricity usage for medical purposes since 2019.

Table 4-69. Change in use of electricity for medical purposes or needs since 2019

Medical usage	All households	Enrolled in Medical Baseline	Not Enrolled in Medical Baseline
Decreased	4%	3%	4%
Stayed the same	55%	53%	57%
Increased	37%	40%	35%
Don't know	4%	4%	3%

4.9 Summary of key survey findings

The EUS Survey collected information directly from PG&E, SCE, and SDG&E customers that completed the 2019 RASS and were likely to have medical needs based on information provided by the utilities and self-reported on RASS. The survey was intended to collect measurable information to better understand household's use of electricity for medical needs and purposes. This section summarizes the key findings from the research.

- **Survey respondents**
  - 1,139 respondents completed the survey, representing 57% of households sampled and invited to participate.
  - The characteristics of the survey respondents were very similar to the characteristics for the overall sample.
- **Heating usage for medical needs**
  - A significant proportion -- 40%-- of total respondents stated that it was important to have extra warmth in their home during cold days and the winter for the health and well-being of household members with medical conditions. About half of respondents in Medical Baseline households reported this, as compared to one-third of respondents in non-Medical Baseline households. By income group, respondents in CARE and FERA eligible households were the most likely to report this need (52%) compared to respondents in moderate-income and non-LMI households (40% and

29% respectively). Respondents in households with non-senior adult and seniors were also more likely to report this than other household types.

- A total of 60% of respondents in households that need extra warmth reported this need being for most or all of their home areas.
- A high portion of respondents report that their households use their main heating system (78%) and portable space heaters (44%) to provide extra warmth, while a smaller number use heated clothing/blankets (37%), fireplaces or wood stoves (21%), or ceiling fans to push warm air down (23%).
- Daytime thermostat settings in the winter skew higher for households requiring extra heating compared to those who do not.
- About two-thirds of respondents from households needing extra warmth indicated their homes were kept at higher temperatures in the winter or on cold days than they would be without a medical need, with 31% reporting setting their thermostat five or more degrees higher due to medical concerns.
- A total 41% of respondents from households needing extra warmth reported they are always able to keep their home as warm as needed, while about 59% reported lower frequencies that may indicate underutilization of heating. Medical Baseline households were more likely to report they could always maintain the needed warmth (50%) compared to non-Medical Baseline households (34%).

- **Cooling usage for medical needs**
  - A total of 35% of respondents stated that it was important to have extra cooling in their home during hot days and the summer for the health and well-being of household members with medical conditions. 44% of respondents from households on Medical Baseline reported that extra cooling on no summer days is important, as compared to 30% of non-Medical Baseline households. Extra summer cooling need for medical reasons was higher in the inland and desert regions (about 40%) than in the mild region (28%). By income group, CARE and FERA eligible households were the most likely to report this need (46%) compared to moderate-income and non-LMI households (37% and 26% respectively). Households with children and households with a mix of non-senior adult and seniors were also more likely to report this than other household types.
  - A whole 62% of households reported that the need for extra summer cooling is for most or all of their home areas.
  - 60% of households use central cooling to provide extra cooling, about 60% use standing fans, about 50% use ceiling fans, 27% use room or window units, and 15% reported other equipment (generally swamp coolers).
  - Daytime thermostat settings in the summer skew lower for households requiring extra cooling compared to those who do not.
  - About 60% of the respondents indicated their homes for kept at lower temperatures in the summer than they would be without a medical need, with a high 21% of respondents reporting that they kept their daytime setting five or more degrees lower due to medical concerns.
  - A total of 36% of respondents report that they can always keep their home as cool as needed in the summer, 32% they can often do this, 30% they can do this occasionally, and 3% reported never being able to do this. Respondents from Medical Baseline households were more likely to report they could always maintain the needed cooling (43%) compared to those from non-Medical Baseline households (30%).

- **Medical devices and equipment**
  - A total of 54% of all respondents reported use of a medical device or assistive equipment that uses electricity the household. Analysis by subgroup finds that non-LMI households and households with a mix of non-senior adults and seniors had the highest percentage of households who use medical equipment that is plugged in for use or

charging. The incidence of medical equipment using electricity also increased by electricity usage group, from 45% of low usage households reporting this to 65% of high usage households.

- Most respondents who reported use of a medical device reported using one device type. However, more than 20% of all respondents reported more than one device type.
- Breathing support devices such as CPAP machines were the most commonly reported type of medical devices in use among respondent households, with 44% of respondents indicating the use of these devices within their households. Most respondents indicate their CPAP machines are in use every day from 1 to 8 hours.
- Air Purification, circulation, or moisture-control devices were reported being used by 13%of respondents, with most reporting regular usage for more than 9 or more hours a day.
- Electric adjustable beds or chairs were reported being used by 11% of households, with a high portion of those respondents indicating their regular use for most of the day and most days of the week.
- Health monitoring devices were used by 6% of respondents with varying frequencies of usage.
- Other device categories were reported by 5% or less of respondents. These devices generally were used less frequently or for limited periods during the day.

- **Refrigeration of medicine**
  - About one in three (34%) of respondents reported the need to refrigerate medicine at a controlled temperature. This proportion didn't differ appreciably between respondents from non-Medical Baseline households (32%) and Medical Baseline households (37%). A slightly larger portion of respondents from Moderate-income households (39%) and high energy usage households (40%) reported this need as compared to the other income and energy usage groups.
  - A total of 87% of respondents storing medicine at a controlled temperature did so in their main refrigerator, while 13% used a secondary refrigerator. Use of a secondary refrigerator for storing medicine was higher for non-LMI households and households with both senior and non-senior adults. Only 2% of low usage households refrigerating medicine did so in a secondary unit compared to and 21% of high usage households.

- **Medical usage needs**
  - A total of 76% of respondents reported medical usage need for electricity in their households. While most respondents residing in households on Medical Baseline (92%) reported this, a large portion of respondents residing in non-Medical Baseline households (67%) also confirmed medical needs that may impact electricity usage.
  - A slight majority (55%) of respondents in households with medical usage needs report that this need has remained consistent since 2019. However, 37% of respondents indicated that electricity usage for medical needs has increased since 2019.

5 WEB TOOL DESIGN AND DEVELOPMENT

5.1 Web tool introduction

The EUS included the development of a web tool that provides users the ability to define what household electricity usage is essential and to explore and evaluate the estimated usage across differently situated customers throughout California[25]. Shortly after the CPUC issued the Decision approving the EUS, the utilities sponsored a meet and confer with stakeholders in November of 2020 to refine the initial scope of the web tool. The development team continued to refine the scope of the web tool throughout the project based on data availability and, as stakeholders, provided additional input on the web tool's functionality.

This section describes the functional capabilities of the EUS Web Tool.

5.2 Web tool capabilities

The key functionality of the EUS Web Tool provides the user the ability to:

- Select the types of household equipment to include in the calculation of an essential electricity usage scenario.
- Select thermostat temperature settings for heating and cooling seasons.
- Filter on characteristics of households to include or exclude from the scenario.
- Choose how to "slice" or group the results.
- Produce crosstabulations of mean estimates of electricity usage (kWh) for essential use consumption and total household consumption, including sample sizes, populations represented and confidence intervals.

The EUS Web Tool allows users to explore scenarios where they can define what types of usage are included in essential electricity use and to select the characteristics to segment (or "slice") the results. The web tool produces a table of estimates of the electric essential use consumption and the average total consumption. This user-defined output enables users to compare and analyze estimated energy usage from different populations with varying household characteristics.

The project documents (such as the Final Report and a User Guide) are available to download from the home page. The EUS Web Tool area (Design Scenario) where users design and run a scenario is only accessible to registered users. Registration requires users to provide a valid email address and password. Once logged in, the user can go to the Design Scenario to query the EUS data. There are four steps to designing and running a scenario:

1. Select components of electric essential use.
2. Create comparisons and specify households.
3. Choose results options.
4. Run scenario.

The four steps are outlined in the following sections and described in more detail in the EUS Web Tool User Guide (APPENDIX I).

5.2.1 Step 1: Select components of electric essential use

5.2.1.1 Default essential use consumption

By default, Essential Use Consumption includes estimated usage for the first refrigerator and interior lighting. If a user does not select any additional types of equipment, the Essential Use Consumption will display the electricity usage of the first refrigerator plus usage for interior lighting. A user cannot remove either the first refrigerator or interior lighting from essential

[25] The EUS Web Tool is available to the public and can be accessed through the following web link: https://caessentialuse.dnv.com

use. Because the majority of respondents indicated in the 2019 RASS that household water was heated using natural gas or propane, water heating is not included as part of the default essential use of electricity. Web tool users can include electric water heating as part of their user-defined essential use of electricity.

5.2.1.2 Electric equipment types

Users can create their own definition of Essential Use Consumption of electricity by selecting electric equipment (end uses) to include in essential usage, beyond the default outlined above. Table 5-1 shows the categories of equipment available for users to select to be included in the Essential Use Consumption.

Table 5-1. Equipment types available to select for essential use consumption

Equipment category	Equipment type
Primary electric space heating	Electric forced air or resistance space heating
	Electric heat pump space heating
Primary cooling	Central air conditioning or heat pump cooling
	Evaporative cooling system
	Room air conditioning unit(s)
Electric water heating	Electric water heater(s)
	Solar water heater w/electric backup
Food preparation	Electric range/oven
	Microwave
	Dishwasher
	Additional refrigerator
	Stand-alone freezer
Heating and ventilation	Attic/whole house/ceiling fan(s)
	Electric auxiliary space heating
Laundry	Clothes washer
	Electric clothes dryer
Entertainment & technology	Television(s)
	Personal computer(s)
	Home office equipment
Spas, hot tubs, pools	Spa filter pump

Equipment category	Equipment type
	Spa electric heat
	Pool pump
Miscellaneous categories	Electric vehicle (s)
	Exterior lighting
	Well pump
	Miscellaneous plug load (includes all electric equipment not specified in categories above)

The Miscellaneous (plug load) is available in increments of 10% (on a scale of 0% to 100%) for a user to include in Essential Use Consumption. Electric usage attributed to medical devices is contained in the Miscellaneous plug load category.

All selected electric appliance categories will be included as part of the essential use calculation outputs for the scenario and are additive to the default Essential Use Consumption. As more electric appliance categories are selected, the calculated Essential Use Consumption will increase.

5.2.2 Step 2: Create comparisons and specify households

This step allows users to decide how they would like to compare Essential Use Consumption and Total Household Consumption between groups or what attributes they would like to define by rows in the scenario, i.e., how to “slice” the population of households. Users can also select a specific subset of households to analyze using the Filters feature.

5.2.2.1 Create comparisons

The scenario analysis requires a minimum of one comparison to be selected. The default scenario slices the results by Electric Utility. A user can keep the default comparison of Electric Utility or select a different way to slice the groups by using the drop-down menus. A user can select up to three ways to slice the results to compare across groups.

Users can select from one to three of the following categories to segment or slice households into groups (rows) in the table of results:

- Electric utility
- Utility baseline territory group
- CEC Title 24 Climate Zone group
- Building type
- Year home built
- Square feet of living space
- Insulated attic
- Insulated exterior walls
- Cooling type
- Primary Heating Electric
- Number of residents
- Children present in home

- Ethnicity of head of household
- Own or rent home
- Estimated household income
- Household on CARE/FERA
- Household on Medical Baseline
- Household Reports Having Medical Equipment
- Net Energy Metered (NEM) household
- Own/lease electric vehicle

The “Slice by” fields define the rows in the results table for the scenario. For example, if “Electric Utility” is selected as a “slice by” field, the results table will display a row with essential usage and total household usage estimates for each electric utility. The default number of “slice by” categories is one, but a user can select up to three. Each category has two or more values that will be displayed as rows. As the number of categories selected increases, the EUS data is “sliced” into a greater number of sub-groups or rows (more slices). As the number of rows increase, the sample sizes for each sub-group or row decrease (thinner slices).

If the sample size (that is, the number of households from the RASS billing data from which the usage estimate is formulated) for a sub-group falls below 25, the values of the EUS calculation for that sub-group are not shown. This is because small sample sizes do not provide sufficient statistical power to generate household estimates of energy use. The user will see the sample size and the population the sample represents but will not see the results for that row. However, the “Total” row at the bottom of the results table includes all the households from the rows, i.e., includes households that are too small of a sample to show results in a separate row (fewer than 25).

Baseline Territory groups

Each utility defines geographic areas called baseline territories or regions. The baseline territories are one factor the utilities consider when they assign a monthly allowance (baseline allocation) of energy that residential customers can purchase at the lowest price. For the EUS and some other purposes, the Baseline Territories are collapsed into a smaller number of groups. The EUS Web Tool provides the Utility Baseline Territory Group as a way for users to “slice” the data. Table 5-2 shows how the baseline territories are aggregated into baseline territory groups. APPENDIX J contains maps of the utility baseline regions.

Table 5-2. Utility baseline territory group to utility baseline territory mapping

Utility baseline territory group	Utility baseline territories
PG&E Cool	T, V and Z
PG&E Warm	Q, X and Y
PG&E Hot	P, R, S and W
PG&E Unknown	Unknown

Utility baseline territory group	Utility baseline territories
SCE Cool	6, 8 and 16
SCE Moderate	5 and 9
SCE Hot	10, 13, 14 and 15
SCE Unknown	Unknown
SDG&E Cool	Coastal
SDG&E Moderate	Inland
SDG&E Hot	Mountain and Desert
SDG&E Unknown	Unknown

CEC Climate Zone groups

The California Energy Commission (CEC) has defined geographic areas called Building Code Climate Zones (T24 Climate Zones). These T24 Climate Zones are used for implementing the Building Energy Efficiency Standards (Title 24, Parts 6 and 11). For the EUS, the Title 24 Climate Zones are collapsed into a smaller number of groups. The EUS Web Tool provides the Climate Zone Group as a way for users to “slice” the data. Table 5-3 shows how Title 24 Climate Zones are aggregated up to Climate Zone Groups. APPENDIX K contains a map of the CEC T24 Climate Zones.

Table 5-3. CEC Climate Zone Group to CEC T24 Climate Zone Mapping

CEC Climate Zone Group	CEC Title 24 Climate Zones
Coastal	1, 2, 3, 4, 5, 6 and 7
Inland	8, 9, 10, 11, 12 and 13
Desert	14 and 15
Mountain	16

5.2.2.2 Specify households

By default, all households are included in the analysis. A user can choose to select specific types of households to be included in the analysis by using the Filters functionality. The categories available as Filters are the same categories available as Group by fields.

The EUS Web Tool provides Geographic Characteristics, Building Characteristics and Household Characteristics for users to help specify their desired population. Table 5-4 through Table 5-6 list the characteristics and values available to specify the households included in the analysis.

Table 5-4 Geographic characteristics and values to specify households to be included in analysis

Geographic Characteristics	
Electric utility	PG&E SCE SDG&E
Utility baseline territory	PG&E (P, Q, R, S, T, V, W, X, Y, Z, Unknown) SCE (5, 6, 8, 9, 10, 13, 14, 15, 16, Unknown) SDG&E (Coastal, Desert, Inland, Mountain, Unknown)
Utility baseline territory group	PG&E (Cool, Warm, Hot, Unknown) SCE (Cool, Moderate, Hot, Unknown) SDG&E (Coastal, Desert, Inland, Mountain, Unknown)
CEC Title 24 Climate Zone	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
CEC Title 24 Climate Zone group	Coastal (1,2,3,4,5,6,7) Inland (8,9,10,11,12,13) Desert (14,15) Mountain (16)

Table 5-5 Building characteristics and values to specify households to be included in analysis

Building Characteristics	
Building type	Single family detached Townhouse, duplex, or row house Apartment or condo (2-4 Units) Apartment or condo (5+ Units) Mobile home
Year home built	Before 1975 1975-1978 1979-1983 1984-1991 1992-1999 2000-2005 2006-2012 2013-2019

Building Characteristics	
Square feet of living space	Less than 500 500-750 751-1000 1001-1250 1251-1500 1501-2000 2001-2500 2501-3000 More than 3000
Insulated attic	Yes, No, Unknown
Insulated exterior walls	Yes, No, Unknown
Cooling type	Central air conditioning system or heat pump cooling only Central evaporative cooler only Room air conditioning unit(s) only Multiple air conditioning systems No cooling Unknown
Primary heating electric	Yes, conventional electric heat Yes, electric heat pump No

Table 5-6 Household characteristics and values to specify households to be included in analysis

Household characteristics	
Number of residents	One Two Three Four Five or More
Children present in home	Yes, No, Unknown

Household characteristics	
Ethnicity of head of household	American Indian AK Native Asian Pacific Islander Black African American Hispanic Latino White Caucasian Other Mixed Unknown
Own or rent home	Own, Rent, Unknown
Estimated household income	Less than $25K $25K-49K $50K-74K $75K-99K $100K-149K $150K-199K Over $200K Unknown
Household on CARE/FERA	Yes, CARE Yes, FERA No Unknown
Household on Medical Baseline	Yes, No, Unknown
Household reports having medical equipment	Yes, No
Net Energy Metered (NEM) household	Yes, No
Own/lease electric vehicle	Yes, No

A user can refine their output report to a specific population of households with the use of filters. For example, if a user checks the filter box for Electric Utility > PG&E, then only households with Electric Utility equal to PG&E will be used in calculation of the results.

5.2.3 Step 3: Choose results options

Users can specify the type of results they would like to see as well as set specific thermostat settings for the cooling season and heating season.

5.2.3.1 Seasonal usage

Users can select whether the essential use estimates are reported over an annual, summer or winter usage periods. By default, the web tool will display all three seasonal usage estimates: annual, summer, and winter.

5.2.3.2 Thermostat settings

The EUS Web Tool makes the option available for users to select Cooling Season and Heating Season Thermostat settings as an indicator of what the user wants to model as the essential use thermostat setting. By default, the web tool uses the thermostat settings as specified by the household in the RASS survey.

In general, as the thermostat setting increases in the cooling season, the calculated estimates of essential use will decrease. The opposite is also true, as thermostat setting decreases in the cooling season, the calculated estimates of essential use will increase.

The inverse is true during the heating season. As thermostat settings increase in heating season, the calculated estimates of essential use will increase. And as the thermostat settings decrease in the heating season, the calculated estimates of essential use will decrease.

5.2.4 Step 4: Run scenario

After the user completes making their selections, they may click on Run Scenario to generate an Output Report table that will open in a new browser tab. Each analysis opens in a new tab, so the user can adjust the analysis and produce a new set of results without losing the previous analysis. The output report has two sections-- the Input Summary and the Results Table.

5.2.4.1 Input summary

The Input Summary section of the Output Report outlines the default and user-selected electric equipment included in the essential use estimates, as well as lists the characteristics used to slice the results and the filters applied to define what households are included in the analysis. The results options also lists the user selection for seasonal usage and thermostat settings for heating and cooling seasons.

5.2.4.2 Results table

The Results Table displays the estimated Essential Use Consumption based on the user inputs and the Total Household Consumption for the sample comprising each row. Confidence intervals at the 90% level are presented for each estimate. Sample size and population represented by that sample are provided for each row.

5.2.4.3 Data displayed

Results are shown for all rows with estimates based on 25 or more households, as listed in the “Sample Size” column of the table. Rows with results based on fewer than 25 households will not display the usage estimates but will show the sample size and population represented by that row.

Electric Utility is required to be a slicer for the seasonal usage (summer, winter) to be shown for accuracy purposes. This requirement is in place because the electric utilities define the seasons differently – SDG&E has an additional month included in their definition of summer, and one fewer month in their definition of winter, as compared to how PG&E and SCE define their summer and winter seasons for allocating baseline usage. Thus, the Total row at the bottom of the Results table will not display the seasonal usage, to avoid combining estimates covering varying time periods.

When a user groups and filters on the same characteristic, the rows representing subsets the user has not included in the analysis will be omitted in the results table. For example, if the user applied a filter to only include “Children Present in

Home" equal to Yes and No (omitting the "Unknown" category), the results table would omit the rows representing results for Unknown whether children are present in the home.

5.2.4.4 Total household consumption

The Total Household Consumption represents the average consumption across the subset of households included in that row. The average is calculated as the Total Household Consumption across households that have different combinations of equipment. For example, some households will have dishwashers, some will not. Some households will have spa filter pumps and spa heaters, and some will not. The average Total Household Consumption only looks at the total for each household but does not break it down into specific types of equipment.

Total Household Consumption stays the same for the type of households (slices) regardless of what categories of equipment the web tool user selects to include in the Essential Use Consumption. If a user runs two scenarios by changing the type of equipment to include in the Essential Use Consumption but not changing the way to slice the households by type, the Total Household Consumption will not change but the Essential Use Consumption will change because different sets of equipment types were selected for each scenario. For example, if a user runs the first scenario by selecting a dishwasher to be included in the Essential Use Consumption, and adds central cooling to the Essential Use Consumption for the second scenario, the values of the estimated the Essential Use Consumption would change, but the values for the Total Household Consumption would remain the same as long as the user did not change the types (slices) of households.

Total Household Consumption will vary across scenarios where the web tool user selects different ways to slice the households into different types. If a webtool user selects the same categories of equipment to include in the Essential Use Consumption for two scenarios, but selects an additional way to slice the households, the Total Household Consumption will change. For example, if a user selects Electric Utility as a slicer in the first scenario but selects both Electric Utility and Building Type as slicers in the second scenario, the Total Household Consumption will be different for the scenarios because the Total Household Consumption is being calculated for different subsets of households in each scenario.

Note: Sum of Winter and Summer Total Household Consumption will be equal to annual consumption.

5.2.4.5 Estimated essential use consumption

By default, essential use includes the first refrigerator and interior lighting. If a user has not selected any additional types of equipment, the Essential Use Consumption will display the electricity usage of the first refrigerator plus usage for interior lighting.

For each of the additional types of equipment a user selects to include in the Essential Use Consumption, the average usage (kWh) will be calculated for the subset of households in that row that have that type of equipment. The average usage will be added to the default to create the estimated Essential Use Consumption for that row. The usage will be summarized by seasonal usage according to the seasonal estimates of each type of equipment.

For example, if a user elects to include dishwashers in Essential Use Consumption, the average usage for dishwashers will be calculated for households in the row that have dishwashers. The average use for dishwashers will be added to the Default Essential Use to represent the Essential Use Consumption of households that have dishwashers.

It is possible that the estimated Essential Use Consumption may be higher than Total Household Consumption based on the end uses a user selects. This can happen because the Essential Use Consumption is **additive** for the categories of equipment, whereas the Total Household Consumption is an **average** consumption of all households of the same type and includes all categories of equipment. (See sections 6.6 and 6.7 of this report for further explanation.)

5.2.4.6 Confidence interval

Each column within the estimated Essential Use Consumption and Total Household consumption includes a confidence interval represented as a +/- in kWh. Confidence Intervals are calculated at the 90% level.

5.2.4.7 Sample size and population represented

The sample size shows the number of households included in the row, as defined by the grouping field selected by the user. The population represented shows the population of households represented by the sample sizes. The population represented is calculated by applying the sample weights for each household. The sample weights were developed under the 2019 RASS project and are unique to each household based on various characteristics. The sample weights per household vary from representing a population of under 10 households to representing almost 15,000 households.

5.2.4.8 Download output report as csv file

Users can download a .csv file of the Input Summary and the Results Table shown in the Output Report tab.

6 DATA DEVELOPMENT

This section summarizes the sources of data and the processing required to prepare the data for use by the EUS Web Tool.

6.1 Sources of data

The EUS leveraged data from the 2019 CA RASS and additional information provided by the utilities. The 2019 RASS dataset provided survey responses covering household characteristics and information about the types of equipment used in homes. The RASS dataset also contained the unit energy consumption (UEC) estimates from the conditional demand analysis (CDA) for the major types of equipment present in homes, and the sample weights that expanded the RASS participants to represent the population.

Of the 39,682 households that were included in the RASS energy analysis, the development team selected the subset of 34,520 RASS participants that were Individually-metered electric customers of PG&E, SCE and SDG&E for the EUS. The team identified the data fields that would be used to characterize households in the EUS Web Tool. Those fields included:

- Electric utility
- Utility baseline territory
- CEC Title 24 Climate Zone
- Building type
- Year home built
- Square feet of living space
- Insulated attic
- Insulated exterior walls
- Primary Heating Electric
- Cooling type
- Net Energy Metered (NEM) household
- Number of residents
- Children present in home
- Household Reports Having Medical Equipment
- Ethnicity of head of household
- Estimated household income
- Own/lease electric vehicle

The EUS also used the electric UEC estimates from the RASS for the following types of equipment:

- Electric forced air or resistance space heating
- Electric heat pump space heating
- Central air conditioning or heat pump cooling
- Evaporative cooling system
- Room air conditioning unit(s)
- Electric water heater(s)
- Solar water heater w/electric backup
- Electric range/oven
- Microwave
- Dishwasher
- First refrigerator
- Additional refrigerator

- Stand-alone freezer
- Attic/whole house/ceiling fan(s)
- Electric auxiliary space heating
- Clothes washer
- Electric clothes dryer
- Television(s)
- Personal computer(s)
- Home office equipment
- Spa filter pump
- Spa electric heat
- Pool pump
- Electric vehicle (s)
- Exterior lighting
- Well pump
- Miscellaneous plug load (includes all electric equipment not specified in categories above)

The utilities provided information critical to EUS including a mapping of RASS participants to their customers and the consumption data that utilities received as data deliverables at the conclusion of the RASS project. The utilities also provided updated contact information for their customers who participated in RASS along with the household enrollment status for various rate assistance programs (CARE, FERA, Medical Baseline, etc.).

All of this information was used for sample design for the interviews and/or surveys, and for constructing the database used by the EUS Web Tool.

6.2 Interior lighting estimates

The 2019 RASS did not estimate the UEC for interior lighting from the CDA. Based on other lighting studies, the RASS estimated interior lighting as approximately 8% of the annual consumption for a household across the RASS population but did not estimate it at the individual household level. The EUS developed an estimate for usage for interior lighting at the household level by leveraging information from several sources based on the type of residential building in RASS (single family, duplex, multifamily, mobile home):

- The average number of lamps per household by building type from the lighting inventory of the 2012 California Lighting and Appliance Saturation Study (2012 CLASS)[26]
- The distribution of lamp types (Incandescent, CFL, LED) for each household from the 2019 RASS survey[27]
- The average wattage per lamp from the CA 2018-2019 Shelf Survey Database[28]
- The average hours of use for each bulb from the CPUC 06-08 Upstream Lighting Study[29]

[26] DNV GL, WO21: RESIDENTIAL ON-SITE STUDY: CALIFORNIA LIGHTING AND APPLIANCE SATURATION STUDY (CLASS 2012), CALMAC ID CPU0095.01

[27] DNV GL Energy Insights USA, Inc. 2020. 2019 California Residential Appliance Saturation Study. California Energy Commission. Publication Number: CEC-200-2021

[28] DNV GL, Shelf Survey Database, UPSTREAM AND RESIDENTIAL DOWNSTREAM LIGHTING IMPACT EVALUATION REPORT, Lighting Sector – Program Year 2018, CALMAC ID CPU0210.01

[29] KEMA, Inc., et. al. PY2006-2008 FINAL EVALUATION REPORT: UPSTREAM LIGHTING PROGRAM, CALMAC ID CPU0015.01

The 2019 RASS survey asked respondents to indicate the portion of lamps installed were incandescent, compact fluorescent (CFL), and light emitting diode (LED)[30]. The proportions as indicated by survey responses were adjusted as needed by the following ways:

- For households in RASS with responses to the questions about percent of lighting provided by different lamp types with answers **totaling greater than 100%**, answers were rescaled to 100%. For example, if a household indicated 50% of their lighting came from CFLs and 75% of their lighting came from LEDs, the percentages were rescaled to 40% and 60% respectively (100%/125% x 50% and 100%/125% x 75%).
- For households in RASS with responses that allocated **less than 100%** of lighting across the three lamp categories (incandescent, CFL, LED), their percentages were similarly scaled up to equal 100%, as long as each lighting type contained a **non-missing** response. (Our assumption is that they may use other types of lighting (halogen, linear fluorescent), that are not captured by RASS, and would remain in the miscellaneous UEC category and not captured by this additional interior lighting calculation.)
- For households reporting **less than 100%** of lighting across the three lamp categories, but for which values are **missing** (versus 0%), a value was imputed using the average lamp distribution percentages from similar households with non-missing responses.

The annual UEC for each lamp type (incandescent, CFL, LED) was calculated following the approach:

$$AnnualUEC_{LampType} = Proportion_{LampType}\ x\ LampCount_{BuildingType}\ x\ Hours\ of\ use\ x\ Wattage_{LampType}.$$

The annual interior lighting consumption value is equal to the sum of the UECs for the three lamp types (incandescent, CFL, LED).

$$AnnualUEC_{InteriorLighting} = AnnualUEC_{Incandescent} + AnnualUEC_{CFL} + AnnualUEC_{LED}.$$

The UEC for Miscellaneous from RASS included usage for interior lighting and other plug load equipment. The EUS needed the separate estimates for interior lighting and the remaining miscellaneous usage. Once the interior lighting consumption value was calculated for EUS, the value was subtracted from the household Miscellaneous UEC. If the calculated interior lighting consumption value for a household was greater than the household miscellaneous consumption, the interior lighting consumption value was limited to the household miscellaneous consumption value.

6.3 Seasonal usage estimates

The EUS study required the annual UECs to be split into summer and winter usage. This is different to the 2019 RASS, which estimated the various equipment UECs on an annual basis. The EUS developed estimates for seasonal usage that aligned with the seasons as defined by each utility's tariffs[31]. PG&E and SCE define the summer season from June through September, spanning four months. The SDG&E definition of summer includes the additional month of October, making their summer 5 months compared to the four-month window for the other two utilities.

[30] The survey response categories (None, Some, About half, Most, All) were changed to proportions (0%, 25%, 50%, 75%, 100%) to estimate the interior lighting consumption for the EUS.

[31] Traditional rate schedules include only two seasons summer from June through September or October, and winter for the rest of the months.

DNV utilized three approaches using different ratios depending on the specific type of measure:

- **Applied load shapes from the National Renewable Energy Laboratory (NREL)[32] for measures other than lighting and space conditioning.** The NREL load profiles were applied to the RASS population at the county and building-type level. Summer and winter ratios were defined by summing the loads for each measure type in the load shape data across the dates in the summer and winter periods for each utility (summer is 5 months for SDG&E, 4 months for PG&E and SCE). The measure specific UECs in the RASS data were then multiplied by these seasonal percentages to arrive at winter/summer specific RASS UECs.

  The measures using NREL load shapes included:

  – First refrigerator (included in the default essential usage)
  – Additional refrigerators
  – Clothes washer
  – Dishwasher
  – Electric dryer
  – Electric solar water heater
  – Electric vehicles
  – Electric water heater
  – Freezer
  – Home Office
  – Microwave
  – Miscellaneous
  – PC
  – Pool pumps
  – Range/Oven
  – Spa
  – Spa heater
  – Television
  – Well Pump

- **Applied ratios for hours of darkness of the relevant season for lighting measures.** Summer and winter lighting ratios were calculated for the latitude and longitude of each household using the sunrise and sunset information from the US Navy. The ratios were calculated using these formulas:

$$LightingRatio_{Summer} = \frac{Hours\ of\ darkness\ in\ summer\ baseline\ period\ for\ each\ household}{Total\ annual\ hours\ of\ darkness\ for\ that\ location}$$

$$LightingRatio_{Winter} = \frac{Hours\ of\ darkness\ in\ winter\ baseline\ period\ for\ each\ household}{Total\ annual\ hours\ of\ darkness\ for\ that\ location}$$

  The measures using the summer/winter lighting ratios included:

  – Interior lighting

[32] The NREL load profiles are available at: https://data.openei.org/submissions/4520.

  - Exterior lighting

- **Applied ratios based on Heating Degree Days (HDD) and Cooling Degree Days (CDD) for heating and cooling measures.** All CDD and HDD were based on the CA normal weather data used in RASS. The summer and winter splits use a 65-degree reference temperature, since that was the temperature used in the RASS engineering models.

  HDD65 **summer** ratio = proportion of HDDs at 65-degree reference temperature in the summer baseline period for the weather station assigned to each household.

  HDD65 **winter** ratio =proportion of HDDs at 65-degree reference temperature in the winter baseline period for the weather station assigned to each household.

  CDD65 **summer** ratio = proportion of CDDs at 65-degree reference temperature in the summer baseline period for the weather station assigned to each household.

  CDD65 **winter** ratio =proportion of CDDs at 65-degree reference temperature in the winter baseline period for the weather station assigned to each household.

  The measures using HDD ratios included:

  - Conventional electric heating
  - Heat pump electric heating
  - Auxiliary electric space heating
  - Furnace fan

  The measures using CDD ratios included:

  - Central air conditioning
  - Evaporative cooling
  - Room air conditioner(s)
  - Attic fan(s)

6.4 Heating and cooling estimates for range of thermostat settings

The EUS Web Tool that supports calculating primary heating and cooling usage for a specific thermostat setting. This required the development of usage estimates for a range of temperatures. The 2019 RASS heating and cooling UECs were calculated using the thermostat setting based on the RASS participant's response to thermostat setting questions. The EUS developed usage estimates for ranges of thermostat settings for primary electric space heating systems (55°F to 85°F) and central space cooling systems (65°F to 95°F).

The general approach was to use the RASS UEC as the default estimate and to adjust for the range of thermostat temperature settings. The approach for adjusting the primary space heating usage is presented below.

The RASS primary space heating UEC for an individual household in RASS *j* is:

$$UEC_{HTj} = c_{g(j)} \times b_{HT} \times ENG_{HTj}$$

where

j = household index,

b_{HT} = CDA model coefficient on the engineering heating term,

$c_{g(j)}$ = calibration factor for the calibration group *g(j)* that includes the household *j,*

ENG_{HTj} = engineering estimate entered into the CDA for household *j*.

and

$TSET_{HTj}$ = time-averaged thermostat temperature setting as reported in RASS

To calculate primary space heating at a designated (*var*) heating thermostat temperature setting $TSET_{HTvar}$,

$$UEC_{HTvarj} = A_{HTj} \times UEC_{HTj}$$

with

$$A_{HTj} = \frac{HDD(65 + TSET_{HTvar} - TSET_{HTj})}{HDD65_{z(j)}}$$

where

$HDD65_{z(j)}$ = HDD65 for CEC climate zone *z* that includes the household *j*

Since the engineering model is proportional to HDD65 and the CDA and calibration are scalars on that model, the usage is estimated at a different thermostat temperature by shifting the assumed reference temperature by the amount of the thermostat temperature shift. This assumes the simplification that the CDA coefficient b_{HT} and the calibration factor $c_{g(j)}$would have been the same if the actual usage from RASS had been at the designated thermostat temperature setting (*var*).

The same approach was followed to estimate the usage at designated thermostat temperature settings for central cooling systems.

6.5 Household sample weights adjustment

The 2019 RASS study placed households into explicit strata based on several variables, including Electric Utility, California Energy Commission (CEC) forecasting zones (15 zones), whether email address was available, whether the customer is net metered (has onsite solar), dwelling type (multi- or single-family), and level of electricity use (high, medium, low). Implicit strata that reflect CEC T24 climate zones, likely use of air conditioner based on ratio of summer electricity use to all use, participation in CARE or FERA, and the neighborhood proportions of low-income dwellings, homes built before 1980, and owner-occupied dwelling.

The RASS sample moved through several stages of follow-up depending on whether they had a valid email address and whether the respondents were selected for additional contact methods. Sampling weights were calculated according to response rates and probabilities of selection for each stratum and each sampling stage (e.g., email only, early paper respondents, late paper respondents, non-response follow-up). The sum of weights for the combined stages summed to the total population of each stratum. For additional details, see the Sampling Approach and Survey Weights sections of the 2019 RASS Report, Volume 1: Methodology.

An effect of the non-response follow-up was that a small number of households selected into that process represented a comparatively large number of households. This resulted in those households having substantially higher weights than the average weight for each stratum, in some cases exceeding 50 times (5,000%) of the average weight. This works well when calculating appliance saturations and UECs for large groups, where the households with large weights still make up a

comparatively small portion of the group but can become an issue for analyses such as provided by the EUS Web Tool, which gives the ability for users to filter down to and calculate UECs for very small populations of interest (minimum 25 households). In the cases where a small analysis domain contains one of these households with a very large weight, the large weight results in UEC estimates that are driven almost entirely by that single household.

The non-response analysis in the 2019 RASS identified that the non-respondent population tended to be less likely to own their home, more likely to contain fewer seniors, and more likely to have a Hispanic head of household, but their equipment and energy usage were similar to the rest of the RASS survey population.

DNV rescaled the weights for these respondents to reduce their leverage on estimates based on smaller groups of respondents. This rescaling was done in six steps:

1. Identify those weights with high leverage. This was done by looking for households in each stratum that had weights two times the median stratum weight or greater.
2. Trim the large weights. The identified households' weights were trimmed to be equal to two times the median weight. This allows the non-respondent households to exert slightly more leverage than the average household on small domain analyses but reflects the fact that the non-respondent households were somewhat different.
3. Calculate a scaling factor for each stratum as the original total stratum weight divided by the total stratum weight after weight trimming.
4. Reweight each stratum's households by applying the scaling factor to each household.
5. Confirm that the reweighted household population total matches the original weighted population total.
6. Weights balancing (aka "raking" – the process of adjusting the weights to match known population totals) ensures that the weights are appropriately matching RASS results in key demographic characteristics.

From an analysis standpoint, the new weights have a limited effect on population-level UEC calculations, but a more significant impact when analyzing small domains. The population level effects are between 0 and 1.6 percent depending on the analysis domain and variable of interest.

6.6 Default estimated household essential usage

The default estimate of household essential electric usage for the EUS is defined as the sum of the estimated usage for the first refrigerator and usage for interior lighting in a home.

$$AnnualUEC_{ESS(j)} = AnnualUEC_{IntLtg(j)} + AnnualUEC_{FirstRef(j)}$$

The seasonal estimates incorporate the appropriate application of ratio for the measure. For example, the default essential usage ($SummerUEC_{ESS(j)}$) for the summer season is calculated using:

$$SummerUEC_{ESS(j)} = (AnnualUEC_{IntLtg(j)} \times LightingRatio_{Summer}) + (AnnualUEC_{FirstRef(j)} \times NRELRefLoadShapeRatio_{Summer})$$

The estimate for the winter season follows the same approach but uses the appropriate ratios for the winter season.

As the EUS Web Tool user selects additional categories of equipment to include in the estimate of essential usage, the additional categories are added to the default essential, using the appropriate seasonal ratios for the categories of equipment. The essential usage calculation is additive, producing usage estimates for the sum of the average usage for that combination of categories of equipment selected by the web tool user.

If the EUS Web Tool user includes space heating or central cooling in essential usage in their scenario, the system uses the default thermostat temperature setting[33] to calculate the estimated essential usage. The web tool user can select specific thermostat temperature settings for space heating and central cooling systems. The essential use adjusts the estimated usage to reflect the temperatures the user selected.

6.7 Total estimated household usage

In contrast to the estimates of essential usage representing the combination of average usage for only the categories of equipment the web tool user selects to include as essential, the total household usage is an estimated average total consumption including all categories of equipment across all households of the same type[34]. This means that the total household estimated usage calculation **averages** the usage from all households of the same type, those with and without all categories of equipment, so the estimated total usage calculation is not the same as the **additive** estimated essential usage calculation (and represents only households **with** the categories of equipment specified by the user).

For annual total household consumption, the annual total estimated usage for each household is averaged across all households. The default thermostat temperature setting is used unless the web tool user selects specific temperatures for electric space heating and/or central cooling systems. When specific temperatures are selected, the system applies the correct adjustments, so the total household estimated usage reflects those temperature settings for all households.

The seasonal total household estimated usage is a simple sum of all of the individual usage estimates for the season for all measures. The appropriate seasonal ratios are applied for the summer and winter seasonal estimates.

[33] The default thermostat temperature setting is based on the RASS participant's survey responses that were used as inputs to the CDA.

[34] In the EUS web tool, the population of households is grouped (sliced) into types based on the user selected characteristics such as geographic location, building type, home vintage, square feet of living space, insulation characteristics, primary heating and cooling equipment presence and a variety of additional household characteristics.

7 SELECTED USAGE PROFILES

DNV ran profiles for various selected segments of households. Each profile includes:

- Electric utility
- Target characteristic of profile (baseline territory, baseline territory group, medical baseline status, medical equipment status, CARE/FERA status)
- All electric household – whether household has central electric space heating
- Essential usage for annual, summer and winter
- Total household usage for annual, summer and winter
- Essential daily usage for annual, summer and winter
- Total household daily usage for annual, summer and winter
- Number of days for the summer and winter

For these profiles, essential use was defined as including the first refrigerator, interior lighting, primary electric space heating, central cooling, and room air conditioning. The thermostat temperature settings were set at 78 degrees Fahrenheit for cooling and at 68 degrees Fahrenheit for primary space heating.

Table 7-1 through Table 7-5 present electric usage for five profiles:

- Electric usage by baseline territory
- Electric usage by baseline territory group
- Electric usage by utility and medical baseline status
- Electric usage by utility and medical equipment status
- Electric usage by utility and CARE/FERA status

Note: The tables in this section are formatted to Tabloid (11” x 17) paper. An Excel workbook is also available as an attachment.
”

7.1 Electric usage by utility baseline territory

Table 7-1 presents the Essential Usage and Total Household Usage for the electric utility baseline territories.

Table 7-1 Electric usage by utility baseline territory

Electric Utility	Baseline Territory	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
PG&E	P	No	2,755	1,453	1,302	8,288	3,091	5,653	7.5	11.9	5.4	22.7	25.3	23.3	122	243
PG&E	P	Yes	4,807	1,512	3,295	10,363	3,136	7,721	13.2	12.4	13.6	28.4	25.7	31.8	122	243
PG&E	Q	No	1,832	685	1,148	6,401	2,131	4,283	5.0	5.6	4.7	17.5	17.5	17.6	122	243
PG&E	Q	Yes	2,760	735	2,025	8,490	2,545	6,038	7.6	6.0	8.3	23.3	20.9	24.8	122	243
PG&E	R	No	3,861	2,343	1,517	8,234	3,547	5,570	10.6	19.2	6.2	22.6	29.1	22.9	122	243
PG&E	R	Yes	5,100	2,343	2,757	10,053	3,717	7,285	14.0	19.2	11.3	27.5	30.5	30.0	122	243
PG&E	S	No	3,020	1,674	1,346	7,428	2,972	5,106	8.3	13.7	5.5	20.4	24.4	21.0	122	243
PG&E	S	Yes	4,212	1,626	2,586	9,318	3,099	6,805	11.5	13.3	10.6	25.5	25.4	28.0	122	243
PG&E	T	No	1,526	538	989	4,461	1,460	3,002	4.2	4.4	4.1	12.2	12.0	12.4	122	243
PG&E	T	Yes	2,385	642	1,743	5,038	1,473	3,565	6.5	5.3	7.2	13.8	12.1	14.7	122	243
PG&E	V	No	1,823	716	1,107	5,660	1,940	3,856	5.0	5.9	4.6	15.5	15.9	15.9	122	243
PG&E	V	Yes	3,158	962	2,196	6,811	2,118	4,766	8.7	7.9	9.0	18.7	17.4	19.6	122	243
PG&E	W	No	4,041	2,466	1,575	7,487	3,378	4,990	11.1	20.2	6.5	20.5	27.7	20.5	122	243
PG&E	W	Yes	4,920	2,445	2,475	7,910	3,220	5,563	13.5	20.0	10.2	21.7	26.4	22.9	122	243
PG&E	X	No	1,914	806	1,109	5,771	1,990	3,908	5.2	6.6	4.6	15.8	16.3	16.1	122	243
PG&E	X	Yes	2,606	754	1,852	5,765	1,723	4,150	7.1	6.2	7.6	15.8	14.1	17.1	122	243
PG&E	Y	No	2,390	1,162	1,227	7,481	2,641	5,109	6.5	9.5	5.1	20.5	21.6	21.0	122	243
PG&E	Y	Yes	4,366	1,050	3,316	9,168	2,540	6,832	12.0	8.6	13.6	25.1	20.8	28.1	122	243
PG&E	Z	No	2,647	1,279	1,367	7,694	2,826	5,387	7.3	10.5	5.6	21.1	23.2	22.2	122	243
PG&E	Z	Yes	2,453	613	1,840	8,956	2,641	6,315	6.7	5.0	7.6	24.5	21.7	26.0	122	243

Electric Utility	Baseline Territory	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
PG&E	Unknown-PGE	No	1,881	874	1,008	5,751	2,070	3,940	5.2	7.2	4.1	15.8	17.0	16.2	122	243
PG&E	Unknown-PGE	Yes	3,163	1,430	1,732	6,701	2,441	4,726	8.7	11.7	7.1	18.4	20.0	19.4	122	243
SCE	10	No	3,261	1,832	1,429	7,456	3,065	5,073	8.9	15.0	5.9	20.4	25.1	20.9	122	243
SCE	10	Yes	3,281	1,316	1,966	6,958	2,422	4,994	9.0	10.8	8.1	19.1	19.9	20.6	122	243
SCE	13	No	3,885	2,367	1,519	8,186	3,519	5,576	10.6	19.4	6.2	22.4	28.8	22.9	122	243
SCE	13	Yes	5,170	2,101	3,068	9,158	3,247	6,829	14.2	17.2	12.6	25.1	26.6	28.1	122	243
SCE	14	No	3,887	2,355	1,532	7,711	3,223	5,075	10.6	19.3	6.3	21.1	26.4	20.9	122	243
SCE	14	Yes	5,144	2,630	2,515	9,079	3,727	6,172	14.1	21.6	10.3	24.9	30.5	25.4	122	243
SCE	15	No	6,950	4,101	2,849	11,556	5,273	7,437	19.0	33.6	11.7	31.7	43.2	30.6	122	243
SCE	15	Yes	7,606	4,163	3,443	13,327	5,557	8,700	20.8	34.1	14.2	36.5	45.5	35.8	122	243
SCE	16	No	2,661	1,346	1,314	6,626	2,420	4,408	7.3	11.0	5.4	18.2	19.8	18.1	122	243
SCE	16	Yes	3,457	1,446	2,011	8,467	2,929	6,079	9.5	11.9	8.3	23.2	24.0	25.0	122	243
SCE	5	No	2,390	1,029	1,361	12,105	4,052	8,241	6.5	8.4	5.6	33.2	33.2	33.9	122	243
SCE	5	Yes	2,141	568	1,574	7,174	2,151	5,043	5.9	4.7	6.5	19.7	17.6	20.8	122	243
SCE	6	No	1,893	766	1,126	5,188	1,793	3,474	5.2	6.3	4.6	14.2	14.7	14.3	122	243
SCE	6	Yes	2,121	650	1,472	4,748	1,468	3,348	5.8	5.3	6.1	13.0	12.0	13.8	122	243
SCE	8	No	2,177	984	1,192	5,435	1,995	3,618	6.0	8.1	4.9	14.9	16.4	14.9	122	243
SCE	8	Yes	2,328	820	1,509	5,019	1,649	3,498	6.4	6.7	6.2	13.8	13.5	14.4	122	243
SCE	9	No	2,648	1,322	1,326	6,233	2,411	4,163	7.3	10.8	5.5	17.1	19.8	17.1	122	243
SCE	9	Yes	2,786	1,106	1,680	5,532	1,932	3,837	7.6	9.1	6.9	15.2	15.8	15.8	122	243
SCE	Unknown-SCE	No	3,311	1,759	1,552	7,555	2,971	4,999	9.1	14.4	6.4	20.7	24.4	20.6	122	243
SCE	Unknown-SCE	Yes	3,387	1,403	1,983	7,762	2,667	5,471	9.3	11.5	8.2	21.3	21.9	22.5	122	243

Electric Utility	Baseline Territory	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
SDG&E	Coastal	No	1,836	891	946	5,137	2,187	3,051	5.0	5.8	4.5	14.1	14.3	14.4	153	212
SDG&E	Coastal	Yes	1,971	725	1,246	4,682	1,788	2,970	5.4	4.7	5.9	12.8	11.7	14.0	153	212
SDG&E	Desert	No	5,132	3,105	2,027	7,806	3,636	4,432	14.1	20.3	9.6	21.4	23.8	20.9	153	212
SDG&E	Desert	Yes	4,517	2,530	1,988	8,129	3,854	4,965	12.4	16.5	9.4	22.3	25.2	23.4	153	212
SDG&E	Inland	No	2,063	1,060	1,004	5,631	2,445	3,367	5.7	6.9	4.7	15.4	16.0	15.9	153	212
SDG&E	Inland	Yes	2,301	899	1,402	5,438	2,127	3,454	6.3	5.9	6.6	14.9	13.9	16.3	153	212
SDG&E	Mountain	No	2,541	1,400	1,141	6,773	3,012	4,075	7.0	9.1	5.4	18.6	19.7	19.2	153	212
SDG&E	Mountain	Yes	3,183	1,312	1,871	9,032	3,618	5,766	8.7	8.6	8.8	24.7	23.6	27.2	153	212
SDG&E	Unknown-SDGE	No	1,891	941	950	5,484	2,318	3,281	5.2	6.2	4.5	15.0	15.1	15.5	153	212
SDG&E	Unknown-SDGE	Yes	2,061	838	1,223	5,217	2,081	3,210	5.6	5.5	5.8	14.3	13.6	15.1	153	212

7.2 Electric usage by utility baseline territory group

Table 7-2 presents the Essential Usage and Total Household Usage for the electric utility baseline territory groups.

Table 7-2 Electric usage by utility baseline territory group

Electric Utility	Baseline Territory Group	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
PG&E	PG&E Cool (T, V, Z)	No	1,544	549	996	4,526	1,487	3,050	4.2	4.5	4.1	12.4	12.2	12.6	122	243
PG&E	PG&E Cool (T, V, Z)	Yes	2,406	651	1,755	5,089	1,491	3,600	6.6	5.3	7.2	13.9	12.2	14.8	122	243
PG&E	PG&E Warm (Q, X, Y)	No	1,931	818	1,113	5,837	2,014	3,955	5.3	6.7	4.6	16.0	16.5	16.3	122	243
PG&E	PG&E Warm (Q, X, Y)	Yes	2,668	764	1,904	5,892	1,754	4,249	7.3	6.3	7.8	16.1	14.4	17.5	122	243
PG&E	PG&E Hot (P, R, S, W)	No	3,401	1,973	1,428	7,759	3,217	5,279	9.3	16.2	5.9	21.3	26.4	21.7	122	243
PG&E	PG&E Hot (P, R, S, W)	Yes	4,673	1,933	2,739	9,559	3,319	6,962	12.8	15.8	11.3	26.2	27.2	28.7	122	243
PG&E	PG&E Unknown	No	1,881	874	1,008	5,751	2,070	3,940	5.2	7.2	4.1	15.8	17.0	16.2	122	243
PG&E	PG&E Unknown	Yes	3,163	1,430	1,732	6,701	2,441	4,726	8.7	11.7	7.1	18.4	20.0	19.4	122	243
SCE	SCE Cool (6,8,16)	No	2,089	917	1,172	5,402	1,937	3,604	5.7	7.5	4.8	14.8	15.9	14.8	122	243
SCE	SCE Cool (6,8,16)	Yes	2,252	750	1,502	4,964	1,589	3,483	6.2	6.2	6.2	13.6	13.0	14.3	122	243
SCE	SCE Moderate (5,9)	No	2,648	1,322	1,326	6,237	2,412	4,165	7.3	10.8	5.5	17.1	19.8	17.1	122	243
SCE	SCE Moderate (5,9)	Yes	2,783	1,104	1,679	5,537	1,932	3,841	7.6	9.1	6.9	15.2	15.8	15.8	122	243
SCE	SCE Hot (10,13,14,15)	No	3,959	2,308	1,651	8,134	3,441	5,438	10.8	18.9	6.8	22.3	28.2	22.4	122	243
SCE	SCE Hot (10,13,14,15)	Yes	4,738	2,232	2,506	8,928	3,403	6,200	13.0	18.3	10.3	24.5	27.9	25.5	122	243
SCE	SCE Unknown	No	3,311	1,759	1,552	7,555	2,971	4,999	9.1	14.4	6.4	20.7	24.4	20.6	122	243
SCE	SCE Unknown	Yes	3,387	1,403	1,983	7,762	2,667	5,471	9.3	11.5	8.2	21.3	21.9	22.5	122	243
SDG&E	SDG&E Cool (Coastal)	No	1,836	891	946	5,137	2,187	3,051	5.0	5.8	4.5	14.1	14.3	14.4	153	212
SDG&E	SDG&E Cool (Coastal)	Yes	1,971	725	1,246	4,682	1,788	2,970	5.4	4.7	5.9	12.8	11.7	14.0	153	212

Electric Utility	Baseline Territory Group	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
SDG&E	SDG&E Moderate (Inland)	No	2,063	1,060	1,004	5,631	2,445	3,367	5.7	6.9	4.7	15.4	16.0	15.9	153	212
SDG&E	SDG&E Moderate (Inland)	Yes	2,301	899	1,402	5,438	2,127	3,454	6.3	5.9	6.6	14.9	13.9	16.3	153	212
SDG&E	SDG&E Hot (Mountain and Desert)	No	2,942	1,664	1,278	6,933	3,108	4,131	8.1	10.9	6.0	19.0	20.3	19.5	153	212
SDG&E	SDG&E Hot (Mountain and Desert)	Yes	3,585	1,679	1,906	8,759	3,689	5,525	9.8	11.0	9.0	24.0	24.1	26.1	153	212
SDG&E	SDG&E Unknown	No	1,891	941	950	5,484	2,318	3,281	5.2	6.2	4.5	15.0	15.1	15.5	153	212
SDG&E	SDG&E Unknown	Yes	2,061	838	1,223	5,217	2,081	3,210	5.6	5.5	5.8	14.3	13.6	15.1	153	212

7.3 Electric usage by utility and medical baseline status

Table 7-3 presents electric usage by utility and medical baseline status.

Table 7-3 Electric usage by utility and medical baseline status

Electric Utility	On Medical Baseline	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
PG&E	Yes	No	2,909	1,577	1,332	7,354	2,910	4,978	8.0	12.9	5.5	20.1	23.9	20.5	122	243
PG&E	Yes	Yes	4,242	1,659	2,582	8,981	2,992	6,438	11.6	13.6	10.6	24.6	24.5	26.5	122	243
PG&E	No	No	2,321	1,134	1,187	6,135	2,276	4,161	6.4	9.3	4.9	16.8	18.7	17.1	122	243
PG&E	No	Yes	3,297	1,143	2,155	6,951	2,231	5,025	9.0	9.4	8.9	19.0	18.3	20.7	122	243
PG&E	Unknown	No	2,013	962	1,052	5,581	2,067	3,831	5.5	7.9	4.3	15.3	16.9	15.8	122	243
PG&E	Unknown	Yes	2,359	1,015	1,344	3,891	1,449	2,505	6.5	8.3	5.5	10.7	11.9	10.3	122	243
SCE	Yes	No	3,373	1,868	1,505	7,852	3,164	5,255	9.2	15.3	6.2	21.5	25.9	21.6	122	243
SCE	Yes	Yes	3,467	1,437	2,029	8,091	2,862	5,675	9.5	11.8	8.4	22.2	23.5	23.4	122	243
SCE	No	No	2,853	1,482	1,370	6,501	2,550	4,342	7.8	12.1	5.6	17.8	20.9	17.9	122	243
SCE	No	Yes	3,046	1,232	1,814	6,150	2,152	4,288	8.3	10.1	7.5	16.8	17.6	17.6	122	243
SDG&E	Yes	No	2,046	1,043	1,004	5,449	2,375	3,252	5.6	6.8	4.7	14.9	15.5	15.3	153	212
SDG&E	Yes	Yes	3,245	1,264	1,981	8,623	3,383	5,602	8.9	8.3	9.3	23.6	22.1	26.4	153	212
SDG&E	No	No	1,930	961	970	5,343	2,293	3,182	5.3	6.3	4.6	14.6	15.0	15.0	153	212
SDG&E	No	Yes	2,090	799	1,291	4,914	1,904	3,110	5.7	5.2	6.1	13.5	12.4	14.7	153	212
SDG&E	Unknown	No	2,555	1,369	1,185	7,977	3,406	4,805	7.0	8.9	5.6	21.9	22.3	22.7	153	212
SDG&E	Unknown	Yes	2,531	966	1,565	5,569	2,136	3,649	6.9	6.3	7.4	15.3	14.0	17.2	153	212

7.4 Electric usage by utility and medical equipment status

Table 7-4 presents electric usage by utility and medical equipment status, based on responses in the 2019 RASS survey.

Table 7-4 Electric usage by utility and medical equipment status

Electric Utility	Has Medical Equipment	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
PG&E	Yes	No	2,607	1,360	1,247	6,855	2,640	4,606	7.1	11.1	5.1	18.8	21.6	19.0	122	243
PG&E	Yes	Yes	3,596	1,251	2,345	7,514	2,431	5,400	9.9	10.3	9.7	20.6	19.9	22.2	122	243
PG&E	No	No	2,332	1,141	1,191	6,148	2,284	4,173	6.4	9.4	4.9	16.8	18.7	17.2	122	243
PG&E	No	Yes	3,332	1,166	2,166	7,030	2,261	5,081	9.1	9.6	8.9	19.3	18.5	20.9	122	243
SCE	Yes	No	3,225	1,778	1,447	7,395	2,974	4,895	8.8	14.6	6.0	20.3	24.4	20.1	122	243
SCE	Yes	Yes	3,173	1,346	1,827	6,731	2,400	4,669	8.7	11.0	7.5	18.4	19.7	19.2	122	243
SCE	No	No	2,848	1,477	1,371	6,494	2,545	4,340	7.8	12.1	5.6	17.8	20.9	17.9	122	243
SCE	No	Yes	3,048	1,230	1,818	6,159	2,153	4,296	8.4	10.1	7.5	16.9	17.6	17.7	122	243
SDG&E	Yes	No	2,041	1,035	1,006	5,491	2,384	3,269	5.6	6.8	4.7	15.0	15.6	15.4	153	212
SDG&E	Yes	Yes	2,203	841	1,362	5,476	2,133	3,459	6.0	5.5	6.4	15.0	13.9	16.3	153	212
SDG&E	No	No	1,932	962	970	5,347	2,295	3,185	5.3	6.3	4.6	14.6	15.0	15.0	153	212
SDG&E	No	Yes	2,148	822	1,325	5,083	1,971	3,226	5.9	5.4	6.3	13.9	12.9	15.2	153	212

7.5 Electric usage by utility and CARE/FERA status

Table 7-5 presents electric usage by utility and CARE/FERA status.

Table 7-5 Electric usage by utility and CARE/FERA status

Electric Utility	CARE/FERA Status	All electric	Annual Essential Usage (kWh)	Summer Essential Usage (kWh)	Winter Essential Usage (kWh)	Annual Total Household Usage (kWh)	Summer Total Household Usage (kWh)	Winter Total Household Usage (kWh)	Daily Annual Essential Usage (kWh)	Daily Summer Essential Usage (kWh)	Daily Winter Essential Usage (kWh)	Daily Annual Total Household Usage (kWh)	Daily Summer Total Household Usage (kWh)	Daily Winter Total Household Usage (kWh)	Summer Days	Winter Days
PG&E	On CARE	No	2,431	1,253	1,178	5,510	2,152	3,676	6.7	10.3	4.8	15.1	17.6	15.1	122	243
PG&E	On CARE	Yes	3,214	1,208	2,007	6,151	2,057	4,429	8.8	9.9	8.3	16.9	16.9	18.2	122	243
PG&E	on FERA	No	2,222	1,072	1,150	6,275	2,311	4,109	6.1	8.8	4.7	17.2	18.9	16.9	122	243
PG&E	on FERA	Yes	3,971	1,178	2,793	8,815	2,683	6,554	10.9	9.7	11.5	24.2	22.0	27.0	122	243
PG&E	No	No	2,327	1,125	1,202	6,455	2,369	4,400	6.4	9.2	4.9	17.7	19.4	18.1	122	243
PG&E	No	Yes	3,399	1,158	2,241	7,406	2,354	5,354	9.3	9.5	9.2	20.3	19.3	22.0	122	243
PG&E	Unknown	No	2,013	962	1,052	5,581	2,067	3,831	5.5	7.9	4.3	15.3	16.9	15.8	122	243
PG&E	Unknown	Yes	2,359	1,015	1,344	3,891	1,449	2,505	6.5	8.3	5.5	10.7	11.9	10.3	122	243
SCE	On CARE	No	2,688	1,398	1,289	5,503	2,189	3,599	7.4	11.5	5.3	15.1	17.9	14.8	122	243
SCE	On CARE	Yes	2,793	1,104	1,690	5,245	1,829	3,652	7.7	9.0	7.0	14.4	15.0	15.0	122	243
SCE	on FERA	No	2,835	1,449	1,387	6,257	2,452	4,173	7.8	11.9	5.7	17.1	20.1	17.2	122	243
SCE	on FERA	Yes	2,765	1,058	1,707	5,638	1,979	3,963	7.6	8.7	7.0	15.4	16.2	16.3	122	243
SCE	No	No	2,948	1,537	1,411	6,984	2,731	4,696	8.1	12.6	5.8	19.1	22.4	19.3	122	243
SCE	No	Yes	3,195	1,308	1,887	6,690	2,345	4,667	8.8	10.7	7.8	18.3	19.2	19.2	122	243
SDG&E	On CARE	No	1,652	789	862	3,983	1,711	2,344	4.5	5.2	4.1	10.9	11.2	11.1	153	212
SDG&E	On CARE	Yes	1,849	713	1,136	3,833	1,487	2,402	5.1	4.7	5.4	10.5	9.7	11.3	153	212
SDG&E	on FERA	No	2,201	1,176	1,024	5,760	2,479	3,420	6.0	7.7	4.8	15.8	16.2	16.1	153	212
SDG&E	on FERA	Yes	2,658	896	1,763	7,520	2,826	4,815	7.3	5.9	8.3	20.6	18.5	22.7	153	212
SDG&E	No	No	2,021	1,017	1,004	5,750	2,470	3,433	5.5	6.6	4.7	15.8	16.1	16.2	153	212
SDG&E	No	Yes	2,262	864	1,398	5,579	2,163	3,549	6.2	5.6	6.6	15.3	14.1	16.7	153	212
SDG&E	Unknown	No	2,555	1,369	1,185	7,977	3,406	4,805	7.0	8.9	5.6	21.9	22.3	22.7	153	212
SDG&E	Unknown	Yes	2,531	966	1,565	5,569	2,136	3,649	6.9	6.3	7.4	15.3	14.0	17.2	153	212

APPENDIX A.INTERVIEW RECRUITMENT SCRIPT & INTERVIEW GUIDE

Recruitment & Scheduling Script

Hello. May I speak to **[ACCOUNT NAME]**?

My name is _____ and I calling from APPRISE on behalf of **[Southern California Edison OR Pacific Gas & Electric OR San Diego Gas & Electric]**. I am calling because about two years ago someone in your household completed the California Home Energy survey, which was a survey that asked about the appliances used in your home. [**IF NEEDED:** According to our records, this survey was completed for your home at **[ADDRESS].**]

We are conducting additional research about how households like yours make decisions about how to use electricity. I would like to schedule a telephone interview to learn more about how your household uses electricity. The interview would ask for you to share your experiences and would take about 30 minutes to complete. Your responses will remain confidential as part of this important research effort, and you would receive a $25 Visa reward card for your participation.

1. Are you willing to participate in this interview?

   YES
   NO **[ASK IF ANOTHER ADULT IN HOME MAY BE WILLING]**

2. Thank you. I would like to schedule an interview, but first I want to confirm two items with you. First, are you an adult age 18 or older?

   YES
   NO **[ASK FOR ADULT; OTHERWISE THANK AND TERMINATE]**

3. I would like to also confirm your home address before we schedule the interview. Is the home at **[ADDRESS]** your year-round residence?

   YES
   NO – PART-YEAR or VACATION HOME **[THANK AND TERMINATE]**
   NO – I MOVED / INCORRECT ADDRESS **[CONFIRM THEY ARE STILL RESIDING IN CA TO CONTINUE]**
   NO – DO NOT LIVE THERE, SOMEONE ELSE LIVES THERE **[THANK AND TERMINATE]**

4. Thank you for confirming those items. When are you available this week to complete the interview? I can work to schedule a time that is convenient for you.

   AVAILABLE NOW **[BEGIN INTERVIEW]**
   AVAILABLE ANOTHER TIME **[RECORD DATE AND TIME]**

5. Is this the best phone number to reach you on **[SCHEDULED DATE/TIME]**?

   YES
   NO **[Record Preferred Phone Number]**

Great. I look forward to speaking with you on **[SCHEDULED DATE/TIME]**. If you have any questions, I can also provide you with my phone number and information. My name is _____ and I can be reached toll-free at 1-888-434-8008.

INTRODUCTION & RECORDING CONSENT (1 minute)
Thank you again for agreeing to participate in this interview. The purpose of the interview is to learn more about how households like yours use electricity. This interview will take about 30 minutes to complete, and your responses will remain

confidential and will not be attributed to you. Once we complete our conversation, you will be mailed a $25 reward card to thank you for completing the interview and sharing your experiences and thoughts with me.

I would like to record our conversation to assist me with accurately noting your responses from the interview. If you approve, the recording would only be used to provide assistance with accurately noting your responses. If you do not approve recording the interview, we can still continue, and I will only type notes during the interview.

Q0. Do I have your permission to record this interview?
Yes
No

[IF YES] Thank you. I have just started recording the conversation. Thank you for providing your permission to record this interview to assist me with taking notes.
[IF NO] Okay. I will not record the interview and will only take notes.

HOME AND HOUSEHOLD INFORMATION (4 minutes)
I would like to start by making sure I have a good understanding of your home. You may have been asked about some of these in the survey you completed previously, but I want to make sure we have current information.

1.1 First, do you RENT or OWN your home?
RENT
OWN
OTHER (Describe)

1.2. Can you provide a description of your household and those who live with you? Has there been a change to the composition of your household due to the coronavirus pandemic? **[PROBE IF NECESSARY]:**
a. Including yourself, is anyone who lives in your home age 65 years and older?
b. Is anyone who lives in your home under 18 years old?
c. Including yourself, does anyone who lives in your home have serious difficulty with daily activities or leaving the home alone because of health challenges, difficulty walking or climbing stairs, or other reasons?

1.6 How, if at all, has the coronavirus pandemic affected the amount of time you or other members of your household spend at home compared to before the pandemic?

a. **[PROBE IF NECESSARY]:** Do you spend more time at home or less time at home compared to before the pandemic? Is that due to a change in your employment, changes in your social activities, or other reasons?

ELECTRICITY USES BY CATEGORY (8 minutes)
Now I want to ask you about different ways you may use electricity in your home. For these questions, please try to think about how you and everyone in your household uses electricity for different purposes throughout the year – in the summer, fall, winter, and spring.

1. In some areas, households find that they need cooling during at least part of the year to have a home that is safe and comfortable. How do you generally cool your home? What are the conditions in which you would choose to use your cooling equipment?

[IF HAS AIR CONDITIONING, ASK QUESTIONS]
a. **[IF NECESSARY]** What types of air condition equipment do you have (i.e., central, room, evaporative)?

b. **[IF NECESSARY]** How do you use it? At what time of year/times of day? What temperature do you set when using your equipment? Are there any other times or circumstances you use the equipment?

c. Thinking about a time when the weather was hotter and you wanted to use your air conditioning equipment, how do you think it would affect your family's well-being if you could only use the equipment for a limited period and could not cool your house as much as you would prefer or would normally? Why would it have that impact?

d. Still thinking about a time when the weather was hotter and you wanted to use your air conditioning equipment, How do you think it would affect your family's well-being if you were not able to use your air conditioning equipment at all? Why would it have that impact?

e. If it was very hot and you were not able to use your air conditioning, what would you do to protect yourself and your family?

2. In some areas, households find that they need to heat their homes during at least part of the year to have a home that is safe and comfortable. How do you generally heat your home? What are the conditions in which you would choose to use your heating equipment?

[IF HAS HEATING EQUIPMENT, ASK QUESTIONS. IF NOT, PROMPT TO ASK ABOUT PLUG-IN PORTABLE SPACE HEATERS]

a. **[IF NECESSARY]** What types of heating equipment do you have? Does it use electricity or another fuel?

b. **[IF NECESSARY]** How do you use it? At what time of year/times of day? What temperature do you set when using your equipment? Are there any other times or circumstances you use the equipment?

c. Thinking about a time when the weather was colder and you wanted to use your heating equipment, how do you think it would affect your family's well-being if you could only use the equipment for a limited period and could not heat your home as much as you would prefer or would normally? Why would it have that impact?

d. Still thinking about a time when the weather was colder and you wanted to use your air conditioning equipment, how do you think it would affect your family's well-being if you were not able to use it at all? Why would it have that impact?

e. If it was very cold and you were not able to use your heating equipment, what would you do to protect yourself and your family?

3. Most households have at least one refrigerator. Some households have a second refrigerator and/or a freezer in the home or garage. What types of refrigerators and freezers do you have in your home?

a. **[IF SECOND REFRIGERATOR]** How do you use your second refrigerator or freezer? Where is it located? Is it always turned on?

b. **[IF SECOND REFRIGERATOR]** Thinking about a time when you wanted to use your second refrigerator, how do you think your family's well-being would be affected if you were not able to use that refrigerator? Why would it have that impact?

c. **[IF FREEZER]** How do you use your freezer? Where is it located? Is it always turned on?

d. **[IF FREEZER]** Thinking about a time when you wanted to use your freezer, how do you think your family's well-being would be affected if you were not able to use that freezer? Why would it have that impact?

4. Most households have some type of cooking equipment in their homes, such as a stove top, a range or oven, a microwave, a toaster or toaster oven, and other kinds of equipment. What types of cooking appliances do you have in your home? Which do you use most often?

Cooking Appliance	Use – Y/N	Use Most Often – Y/N
Stovetop or Cooktop		
Range or Oven		
Microwave		

Toaster/Toaster Oven		
Other -		
Other -		
Other -		

a. If you suddenly could not use electricity, what cooking equipment would it be a problem to go without? If that lasted for at least several days, how would that affect your family's well-being? Why would it have that impact? Is there anything that you could do to accommodate the loss of that equipment?

5. This next question concerns electronic devices like TVs, computers, internet devices, entertainment devices, and charging devices. Which of those devices do you have in your home? Which of those devices do you use most often?

Electronic Devices	Use – Y/N	Use Most Often – Y/N
TVs		
Computers/Laptops		
Internet Devices		
Chargers		
Other -		
Other -		
Other -		

a. If you suddenly could not use electricity, which type of electronic devices would it be a problem to go without? If that lasted for at least several days, how would that affect your family's well-being? Why would it have that impact? Is there anything that you could do to accommodate the loss of that equipment?

6. **[IF NOT MEDICAL BASELINE]** Does anyone in your household use a medical device that requires electricity or have a medical condition that requires using heating, cooling, or air purifying? **[IF NO OR UNSURE, PROVIDE EXAMPLES.]**

   [IF YES (HAS MEDICAL DEVICE OR CONDITION), ASK QUESTIONS]

   a. What kind of medical devices or equipment are used? When/how often is each used?

   b. If you suddenly could not use electricity, how do you think being unable to use [the device or maintain heating/cooling/air purification] would impact that person? If that lasted for at least several days, how would that affect his or her well-being? Why would it have that impact? Is there anything that you could do to accommodate the loss of that [device or heating/cooling/air purification]?

7. **[IF MEDICAL BASELINE]** According to our records, your home is participating in the California Medical Baseline program. That program provides electricity at a lower cost to help households who depend on power for certain medical needs. This could include needing to use medical devices that run on electricity, or having a medical condition that requires using heating, cooling, or air purifying. Can you please tell me about the medical needs in your household that require electricity?

   a. What kind of medical devices or equipment are used? When/how often is each used?

b. If you suddenly could not use electricity, how do you think being unable to use [the device or maintain heating/cooling/air purification] would impact that person? Why would it have that impact? If that lasted for at least several days, how would that affect his or her well-being? Is there anything that you could do to accommodate the loss of that [device or heating/cooling/air purification]?

8. Are there any other ways your household uses electricity that we have not discussed that are important for your household?

AFFORDABILITY & TRADE-OFFS (4 minutes)

Now I want to ask you about the affordability of your electric bills and how you make choices about managing your expenses and budget.

9. Have you ever had a time when you had to skip paying other bills in order to help pay your electric bill? This could include paying less than was due for other bills to help pay your electric bill.

    a. **[IF YES]** Can you tell me about this? What did you spend less on or skip paying for? What led you to make the decision instead of skipping or paying less than you owed on your electric bill? For how long did this go on?

    b. **[IF YES]** How do you think that doing this impacted your family's well-being? Why did it have that effect?

10. Have you ever had a time when you had to skip purchasing necessities like food, medicine, or medical care in order to help pay your electric bill?

    a. **[IF YES]** Can you tell me about this? What do you skip purchasing or spend less on? What led you to make that decision instead of skipping or paying less than you owed on your electric bill? For how long did this go on?

    b. **[IF YES]** How do you think that doing this impacted your family's well-being? Why did it have that effect?

11. **[IF NO TO BOTH]** So you have never found that your electric bill exceeded your budget or what you could pay?

ELECTRICITY UNDERUTILIZATION (10 minutes)

I would like you to imagine a scenario for me. Imagine that tomorrow, your household learns it cannot afford your current electric bills, and that you won't be able to afford them throughout the next year – in the summer, fall, winter, and spring. This could be because you lose a source of income or savings, or you have a large, unexpected expense for something else that can't be avoided. Please imagine that you would not be able to get help in paying your electric bills from other people or sources.

12. If this situation happened, what changes do you think your household would make to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**

13. **[IF THEY DID NOT MENTION A/C ABOVE]:** How, if at all, do you think your household would make changes to how you use air conditioning to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**
    a. Do you think your household would reduce your A/C use?
    b. Do you think your household would try to change the time of day you use A/C or other cooling devices to avoid using electricity at certain times of day when the electricity rates or charges may be higher?
    c. Do you think your household would use fans or some other type of cooling equipment in place of A/C?
    d. Do you think your household would block off or not use certain parts of your home in order to save on cooling costs?
    e. Do you think any members of your household would spend less time at home and more time at other locations to avoid using A/C at home?

f. Has your household ever actually had to make changes to how you use air conditioning due to a situation like the one mentioned above?

   i. **[IF YES to 13b]:** What changes did you make?

   ii. **[IF YES to 13b]:** How did those changes impact the health, safety, and well-being of the members of your household? Why did they have that effect?

14. **[IF THEY DID NOT MENTION ELECTRIC HEATING ABOVE]:** How, if at all, do you think your household would make changes to how you use your main heating and/or space heaters to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**

    a. **[IF ELECTRIC MAIN HEAT]:** Do you think your household would reduce your usage of your main heat?

    b. **[IF ELECTRIC MAIN HEAT]:** Do you think your household would use space heaters or some other heating device in place of your main heat?

    c. **[IF SPACE HEATERS ONLY]:** Do you think your household would reduce your overall usage of your space heaters?

    d. Do you think your household would try to change the time of day you use your electric heating devices or to avoid using electricity at certain times of day when the electricity rates or charges may be higher?

    e. Do you think your household would block off or not use certain parts of your home in order to save on heating costs?

    f. Do you think any members of your household would spend less time at home and more time at other locations in order to avoid using heating costs at home?

    g. Has your household ever actually had to make changes to your heating use due to a situation like the hypothetical one mentioned above?

       i. **[IF YES to 14b]:** What changes did you make?

       ii. **[IF YES to 14b]:** How did those changes impact the health, safety, and well-being of the members of your household? Why did they have that effect?

15. **[IF THEY DID NOT MENTION FRIDGES/FREEZERS ABOVE]:** How do you think your household would make changes to how you use your refrigerator(s) or freezer(s) to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**

    a. Would your household modify the temperature on any of your fridges or freezers?

    b. **[IF MULTIPLE FRIDGES/FREEZERS]** Would your household unplug your additional fridge or freezer?

    c. Has your household ever actually had to change your fridge or freezer use due to a situation like the one mentioned above?

       i. **[IF YES to 15b]:** What changes did you make?

       ii. **[IF YES to 15b]:** How did those changes impact the health, safety, and well-being of the members of your household? Why did they have that effect?

16. **[IF THEY DID NOT MENTION ELECTRIC COOKING EQUIPMENT ABOVE]:** How do you think your household would make changes to the way you use your electric cooking equipment to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**

    a. Do you think your household would switch from using one type of cooking equipment to another to try to save on electricity? If so, what specifically would you change?

    b. Do you think your household would make changes to the times of day you cook or the frequency at which you cook?

    c. Has your household ever actually had to make changes to how you use your electric cooking equipment due to a situation like the one mentioned above?

i. **[IF YES to 16b]:** What changes did you make?

ii. **[IF YES to 16b]:** How did those changes impact the health, safety, and well-being of the members of your household? Why did they have that effect?

17. **[IF THEY DID NOT MENTION ELECTRONIC DEVICES ABOVE]** Under the hypothetical scenario we've been mentioning, do you think your household would make changes to the way you use electronic devices (such as TVs, computers, chargers, etc.) to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**
    a. Do you think your household would reduce the use of any of your electronic devices?
    b. Do you think your household would switch from using one type of electronic device to another to try to save on electricity?
    c. Do you think you would modify when you use any of your electronic devices to avoid using electricity at times when rates may be higher?
    d. Have you ever actually had to modify your use of electronic devices due to a situation like the one mentioned above?
        i. **[IF YES to 17b]:** What changes did you make?
        ii. **[IF YES to 17b]:** How did those changes impact the health, safety, and well-being of the members of your household? Why did they have that effect?

18. **[IF THEY HAVE MEDICAL EQUIPMENT AND DID NOT MENTION IT ABOVE]** Earlier you mentioned that someone in your household uses a medical device that uses electricity. If you faced a situation like the one we are imagining, do you think your household would make any changes to how the medical device is used to try to use less electricity and lower your bill? **[PROBE IF NECESSARY]:**
    a. Do you think your household would use that device less?
    b. Do you think your household would change how the device is used?
    c. Do you think your household would change the time of day that the device is used to try to avoid using it at times when electricity rates may be higher?
    d. Has your household ever actually had to make changes to the use of medical equipment due to a situation like the one mentioned above?
        i. **[IF YES to 17b]:** What changes did you make?
        ii. **IF YES to 17b]:** How did those changes affect the health, safety, and well-being of the family member(s) that uses the medical equipment? Why did they have that effect?

19. **[IF THEY DID NOT MENTION ABOVE]** Finally, under this hypothetical scenario, what kinds of electricity uses would your household <u>not</u> be able to use less of? Why not?

<u>ELECTRICITY CONSERVATION (3 minutes)</u>

I want to ask you now about any decisions you may have made to use less electricity or to keep your electricity use lower when you were **<u>not</u>** specifically concerned about being able to afford or pay your electric bill.

20. Has your household ever tried to use less electricity or to conserve because you were concerned about your impacts on the environment?
    a. **[IF YES]:** What kind of things did/do you use less of for this reason?
    b. **[IF YES]:** How do you think this impacted your family's well-being? Why did they have that effect?

21. Has your household ever tried to use less electricity or to conserve because you wanted to save money or keep electricity expenses low, even though you could afford to pay a higher bill?

    a. **[IF YES]:** What kind of things did/do you use less of for this reason?

    b. **[IF YES]:** How do you think this impacted your family's well-being? Why did they have that effect?

22. If your electricity for the next year was free and you did not need to pay any electric bills, do you think your household would use electricity differently? How so?

DEMOGRAPHICS (1 minute)

I just have a few final questions for you to help us make sure we are reaching a variety of people.

23. **[CONFIRM OR ASK IF NOT ALREADY MENTIONED]** Please tell me which of the following categories includes your age.
    Age 19-34
    Age 35-54
    Age 55-64
    Age 65 or older

24. Finally, do you identify as male, female, or in some other way?

CLOSING (1 minute)

25. Thank you. Those are all of my questions. We will mail you your reward card in the next week. Can you please confirm for me your name and the address where we should mail the reward card?

    NAME:
    MAILING ADDRESS:

Thank you again for your time and participation. It is greatly appreciated! If you have any questions or do not receive your reward card in the next month, please contact us. Have a great day.

APPENDIX B. INTERVIEW SAMPLE

The sample frame for the qualitative interviews was stratified into 24 strata. Table B-1 show the total households in the sample frame, the total households sampled and released for contacting, the target interview goals, and the final count of completed interviews by stratum.

Table B-1. Sample strata

Stratum	Sample Frame	Sampled and Released	Target Interview Goal	Completed Interviews
1 - Low - Medical Baseline - Seniors or Children - Has Cooling	10	3	1	1
2 - Low - Medical Baseline - Seniors or Children - No Cooling	10	3	1	1
3 - Low - Medical Baseline - No Seniors or Children - Has Cooling	17	16	2	2
4 - Low - Medical Baseline - No Seniors or Children - No Cooling	10	3	1	2
5 - Low - Not Medical Baseline - Seniors or Children - Has Cooling	55	34	5	3
6 - Low - Not Medical Baseline - Seniors or Children - No Cooling	62	43	5	6
7 - Low - Not Medical Baseline - No Seniors or Children - Has Cooling	54	39	5	5
8 - Low - Not Medical Baseline - No Seniors or Children - No Cooling	53	31	5	6
9 - Medium - Medical Baseline - Seniors or Children - Has Cooling	11	9	1	1
10 - Medium - Medical Baseline - Seniors or Children - No Cooling	10	2	1	1
11 - Medium - Medical Baseline - No Seniors or Children - Has Cooling	21	11	2	2
12 - Medium - Medical Baseline - No Seniors or Children - No Cooling	8	2	1	1
13 - Medium - Not Medical Baseline - Seniors or Children - Has Cooling	57	38	5	5
14 - Medium - Not Medical Baseline - Seniors or Children - No Cooling	55	41	5	4
15 - Medium - Not Medical Baseline - No Seniors or Children - Has Cooling	55	44	5	6

Stratum	Sample Frame	Sampled and Released	Target Interview Goal	Completed Interviews
16 - Medium - Not Medical Baseline - No Seniors or Children - No Cooling	49	33	5	6
17 - High - Medical Baseline - Seniors or Children - Has Cooling	12	7	1	2
18 - High - Medical Baseline - Seniors or Children - No Cooling	8	6	1	1
19 - High - Medical Baseline - No Seniors or Children - Has Cooling	16	16	2	1
20 - High - Medical Baseline - No Seniors or Children - No Cooling	5	5	1	0
21 - High - Not Medical Baseline - Seniors or Children - Has Cooling	62	44	5	4
22 - High - Not Medical Baseline - Seniors or Children - No Cooling	46	30	5	7
23 - High - Not Medical Baseline - No Seniors or Children - Has Cooling	50	49	5	3
24 - High - Not Medical Baseline - No Seniors or Children - No Cooling	38	28	5	7
Total	**774**	**537**	**75**	**77**

APPENDIX C. INTERVIEW CALLING DISPOSITIONS

Table C-1 shows the calling dispositions. Overall, the interview completion rate was 14%, the estimated eligibility rate was 91%, and the estimated response rate was 16%.[35]

Table C-1. Final dispositions

Final disposition	Frequency	Percent
Non-working number	32	6%
Wrong number	11	2%
Deceased	2	<1%
Ineligible - Moved out of CA	2	<1%
Quota Reached	4	1%
Too ill to participate	2	<1%
Other technical problem	9	2%
Not available for duration of fielding	1	<1%
Hearing/language barrier	2	<1%
Busy signal	9	2%
Voicemail	165	31%
No answer	99	18%
Call-back	14	3%
Broken Appointment	1	<1%
Pretest Complete (Not Usable)	1	<1%
Max Attempts Reached	18	3%
Soft Refusal/Declined Participation	79	15%
Hard Refusal	9	2%
Completed	77	14%
Total	**537**	**100%**

[35] Eligible households included all households with valid contact information who could have participated. Ineligible households include households with non-working or incorrect phone numbers, or households with deceased contacts or contacts who moved out of state. The response rate was calculated as 77 completed interviews divided by 490 households classified as eligible for the interview.

APPENDIX D. SURVEY ADVANCE LETTER EXAMPLE

SOUTHERN CALIFORNIA EDISON®

P.O. Box 800
Rosemead, CA 91770

< Name >
< Address Line One > < Address Line Two >
< City >, < State > < Zip Code>

Dear [NAME]:
Southern California Edison (SCE) is conducting an important study to better understand crucial electricity needs of California households, including electricity used for medical purposes.
I am contacting you because you have been selected to participate in a short survey about important uses of electricity in your home. You have been selected to participate in this survey because your household completed the California Home Energy Survey approximately two years ago. We need your help to complete this additional research and have included the attached $5 bill as a thank you for your time. This survey will take about 5 to 10 minutes to complete.
You can complete the survey by following these instructions:

Option 1. Complete the survey online at: www.appriseinc.org/casurvey
To begin the survey, enter your Access Code.
Your Access Code is: «APPRISE_ID»

QR Code

You can also access the survey by scanning the QR code shown to the right with your mobile device camera or app.

Option 2. Call APPRISE toll-free at 1-888-434-8008 to complete the survey by telephone. When you call, please ask for Alexis and have your access code available (your access code is noted above). You may call APPRISE from 7 a.m. to 2 p.m. PT on weekdays.

This research is sponsored by SCE and is being conducted by independent research firms APPRISE and DNV. All information collected in the survey will be kept confidential and will not be attributed to you. If you have any questions about the survey, please contact me. Thank you for your time and participation.

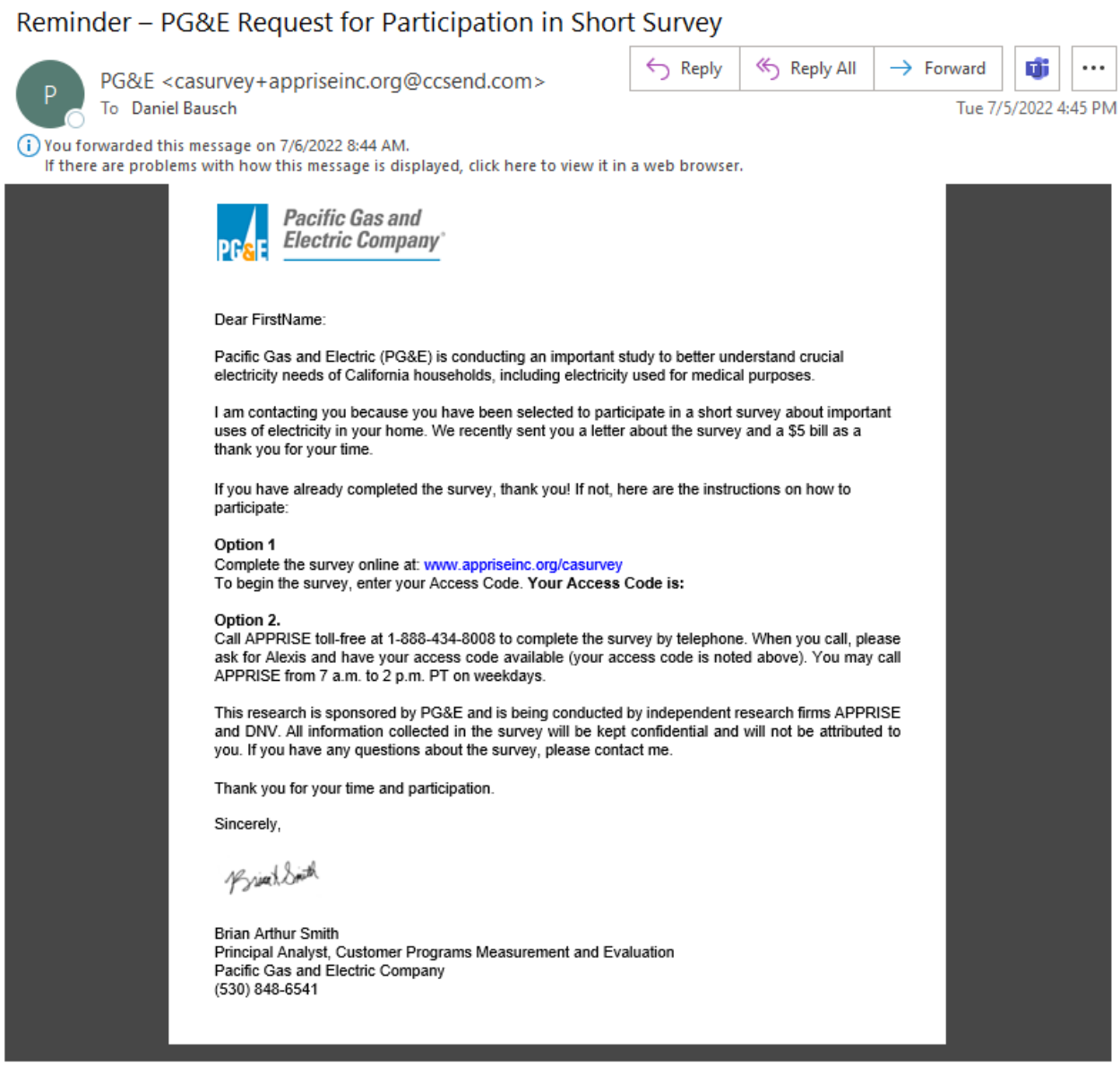
Sincerely,

Reginald A. Wilkins

Reginald Avery Wilkins, Ph.D.
Measurement and Evaluation
Southern California Edison
(626) 302-0640

Para completar la encuesta en español, llame al 1-888-434-8008 y pregunte por Roberto.

APPENDIX E. SURVEY EMAIL REMINDER EXAMPLE



Reminder – PG&E Request for Participation in Short Survey

P

PG&E <casurvey+appriseinc.org@ccsend.com>
To Daniel Bausch

Reply | Reply All | Forward

Tue 7/5/2022 4:45 PM

You forwarded this message on 7/6/2022 8:44 AM.
If there are problems with how this message is displayed, click here to view it in a web browser.

Pacific Gas and Electric Company

Dear FirstName:

Pacific Gas and Electric (PG&E) is conducting an important study to better understand crucial electricity needs of California households, including electricity used for medical purposes.

I am contacting you because you have been selected to participate in a short survey about important uses of electricity in your home. We recently sent you a letter about the survey and a $5 bill as a thank you for your time.

If you have already completed the survey, thank you! If not, here are the instructions on how to participate:

Option 1
Complete the survey online at: www.appriseinc.org/casurvey
To begin the survey, enter your Access Code. **Your Access Code is:**

Option 2.
Call APPRISE toll-free at 1-888-434-8008 to complete the survey by telephone. When you call, please ask for Alexis and have your access code available (your access code is noted above). You may call APPRISE from 7 a.m. to 2 p.m. PT on weekdays.

This research is sponsored by PG&E and is being conducted by independent research firms APPRISE and DNV. All information collected in the survey will be kept confidential and will not be attributed to you. If you have any questions about the survey, please contact me.

Thank you for your time and participation.

Sincerely,

Brian Arthur Smith
Principal Analyst, Customer Programs Measurement and Evaluation
Pacific Gas and Electric Company
(530) 848-6541

APPRISE | 32 Nassau St, Princeton, NJ 08542 casurvey@appriseinc.org

Unsubscribe daniel-bausch@appriseinc.org

Update Profile | Constant Contact Data Notice

APPENDIX F. SURVEY INSTRUMENT

Introduction for Web Survey

Welcome to the California Electricity Usage Survey!

You have been selected to participate in this important survey because our records indicate someone in your household completed the California Home Energy Survey approximately two years ago. We are now conducting additional research to better understand the key electricity needs of California households. The purpose of this survey is to collect additional information about how households like yours use electricity. You should have received a letter or e-mail with information about this survey.

This survey should take about 5 minutes to complete, and your responses will remain confidential and will not be attributed to you.

You will need your Access Code to begin the survey. If you start the survey and need to return later to finish it, you can do so by returning to this website and entering your Access Code. If you have any problems, please email Daniel-bausch@appriseinc.org for assistance.

To begin the survey, click "Next."

SCREENER

A0. Please enter your Access Code to begin. Your Access Code is included in the email or letter you received about the survey.

Enter Access Code _____

A1. Can you please confirm if you have lived at the address shown below since 2019 or earlier?

[STREET]
[CITY], CA

1. Yes - Lived at address since 2019 or earlier
2. No - Moved to this address after 2019 **[THANK AND TERMINATE]**
3. Have never lived at the address shown **[THANK AND TERMINATE]**

SECTION I - HEATING

We are interested in learning more about how households like yours may use electricity to address the needs of residents who live in the home and have medical conditions or medical needs.

HQ1. Including yourself, does anyone in your household have a medical condition where it is important to keep areas in your home extra warm in the winter or on cold days to maintain that person's health and well-being?

1. No
2. Yes

HQ2. **[ASK IF HQ1=YES]** Which parts of your home are important to keep extra warm in the winter or on cold days due to someone in your household having a medical condition?

1. Entire home or most of home
2. Specific rooms or limited area in the home

HQ2b. **[ASK IF HQ1=YES]** How often during the winter are you able to keep **[IF HQ2= WHOLE HOME, "your home"; IF HQ2=SOME ROOMS, "the areas that need it"]** as warm as [it/they] should be to maintain the health and well-being of those who have a medical condition where it is important to do so?

1. Never
2. Rarely (a few days during the season)
3. Sometimes (a few times a month)
4. Often (a few days a week)
5. Always (every day)

HQ3. **[ASK IF HQ1=YES & HQ2b IS NOT NEVER]** What do you use to keep **[your home OR these areas]** extra warm in the winter or on cold days? Please select all that apply.

1. Main heating system, such as built-in heating units

2. Portable space heater(s)
3. Fireplace or wood stove
4. Heated clothing or blankets
5. Ceiling Fans to push warm air down

HQ4. What is the average thermostat temperature usually set to in **[IF HQ1= NO OR HQ2 = WHOLE HOME, "your home"; IF HQ2=SOME ROOMS, "the areas that are kept extra warm"]** during the daytime in the winter or heating season?

1. Below 50° F
2. 50 - 54° F
3. 55- 60° F
4. 61 - 65° F
5. 66 - 70° F
6. 71 - 75° F
7. 76 - 80° F
8. Above 80° F
9. No Thermostat (simple on/off or high/low control or steam valve)

HQ5. **[ASK IF HQ1=YES & HQ4=1 to 8]** How much warmer do you think the thermostat is set in the winter in **[HQ2 = WHOLE HOME, "your home"; IF HQ2=SOME ROOMS, "the areas that are kept extra warm"]** than it would be set if there was not a medical need requiring extra warmth?

1. No warmer (thermostat setting would be kept the same)
2. 1 - 2° warmer
3. 3 - 4° warmer
4. 5 - 6° warmer
5. 7 - 8° warmer
6. 8 - 9° warmer
7. 10 or more degrees warmer

SECTION II - COOLING

CQ1. Including yourself, does anyone in your household have a medical condition where it is important to keep areas in your home extra cool in the summer or on hot days to maintain that person's health and well-being?

1. No
2. Yes

CQ2. **[ASK IF CQ1=YES]** Which parts of your home are important to keep extra cool in the summer or on hot days due to someone in your household having a medical condition?

1. Entire home or most of home
2. Specific rooms or limited area in the home

CQ2b. **[ASK IF CQ1=YES]** How often during the summer are you able to keep **[IF HQ2= WHOLE HOME, "your home"; IF HQ2=SOME ROOMS, "the areas that need it"]** as cool as [it/they] should be to maintain the health and well-being of those who have a medical condition where it is important to do so?

1. Never
2. Rarely (a few days during the season)
3. Sometimes (a few times a month)
4. Often (a few days a week)
5. Always (every day)

CQ3. **[ASK IF CQ1=YES & CQ2b IS NOT NEVER]** What do you use to keep **[IF CQ2= 1 "your home"; If CQ2=2 "these areas"]** extra cool during the daytime in the summer or on hot days? Please select all that apply.

1. Central cooling system
2. Room or Window air conditioners
3. Ceiling Fans to pull warm air up
4. Fans
5. Other (Specify)

CQ4. What is the average thermostat temperature usually set to in **[IF CQ1= NO OR CQ2 = WHOLE HOME, "your home"; IF CQ2=SOME ROOMS, "the areas that are kept extra cool"]** during the summer or cooling season?

1. Below 65° F
2. 65 - 67° F
3. 68 - 69° F
4. 70 - 73° F
5. 74 - 76° F
6. 77 - 80° F
7. 81 - 85° F
8. Over 85° F
9. No Thermostat (simple on/off or high/low control)

CQ5. **[ASK IF CQ1=YES & CQ4=1 to 8]** How much cooler do you think the thermostat is set in the summer in **[CQ2 = WHOLE HOME, "your home"; IF CQ2=SOME ROOMS, "the areas that are kept extra cool"]** than it would be set if there was <u>not</u> a medical need requiring extra cooling?

1. No cooler (thermostat setting would be kept the same)
2. 1 - 2° cooler
3. 3 - 4° cooler
4. 5 - 6° cooler
5. 7 - 8° cooler
6. 8 - 9° cooler
7. 10 or more degrees cooler

<u>SECTION III – MEDICAL EQUIPMENT</u>

MQ1. Including yourself, does anyone in your household have a medical or health condition that requires the use of one or more medical devices or assistive equipment that need to be plugged-in to use or plugged in for charging? This can include medical equipment or machines recommended by a doctor, or devices that use electricity and assist with mobility.

1. No
2. Yes

MQ2. **[ASK IF MQ1=YES]** Which types of plugged-in medical devices or assistive equipment are used in your household? Please select all that apply. **[DISPLAY AS TABLE WITH CHECK BOXES; RANDOMIZE RESPONSE OPTIONS]**

1. Breathing support device, including CPAP machines, nebulizers, and respirators (oxygen concentrators)
2. Air purification, circulation, or moisture-control device
3. Health monitoring device
4. Electric nerve stimulator
5. Pressure pad or pump
6. Eating equipment or suction machine for swallowing
7. Dialysis machine
8. Electric wheelchair, cart, or stairlift
9. Electric adjustable bed or chair
10. Other device(s) not listed above (Please describe the device: _____)

MQ3. **[ASK IF MQ1=YES] [DISPLAY TABLE WITH SELECTED ITEMS FROM MQ3]** For each type of device you selected, please indicate how often during a typical week the device(s) are plugged in and turned on for use or plugged in for charging. [Response options are below the list of devices but will be shown for each device when the survey is implemented.]

a. Breathing support devices, including CPAP machines, nebulizers, and respirators (oxygen concentrators)
b. Air purification, circulation, or moisture-control devices
c. Health monitoring devices
d. Electric nerve stimulators
e. Pressure pads and pumps

f. Eating equipment or suction machines for swallowing
g. Dialysis machines
h. Electric wheelchair, cart, or stairlift
i. Electric adjustable bed or chair
j. Other _____

1. Never
2. Rarely (1-2 days per week)
3. Sometimes (3-4 days per week)
4. Often (5-6 days per week)
5. Always (7 days per week)

MQ4. **[ASK IF MQ1=YES] [DISPLAY TABLE WITH SELECTED ITEMS FROM MQ3]** On a typical day when these device(s) are being used, how many hours in the day are they plugged in and turned on for use or plugged in for charging. [Response options are below the list of devices but will be shown for each device when the survey is implemented.]

a. Breathing support devices, including CPAP machines, nebulizers, and respirators (oxygen concentrators)
b. Air purification, circulation, or moisture-control devices
c. Health monitoring devices
d. Electric nerve stimulators
e. Pressure pads and pumps
f. Eating equipment or suction machines for swallowing
g. Dialysis machines
h. Electric wheelchair, cart, or stairlift,
i. Electric adjustable bed or chair
j. Other Device Not Listed (Please describe the device: _____)

1. Less than 1 hour
2. 1 to 8 hours
3. 9 to 16 hours
4. 17 to 24 hours

MQ5. Including yourself, does anyone in your household use a refrigerator or similar device to store medicine that needs to be kept at a controlled temperature?

1. No
2. Yes

MQ6. **[ASK IF MQ5=YES]** Is the medicine stored in your main refrigerator or in a secondary unit, such as a minifridge?

1. Main refrigerator
2. Secondary refrigerator

MQ7. [**ASK IF HQ1=YES, OR CQ1=YES, OR MQ1=YES, or MQ5=YES**] The ways that a household uses electricity can change over time. Please think about how your household uses electricity now compared to how you used electricity three years ago in 2019 (before the coronavirus pandemic began).

Thinking about your household, do you think your use of electricity <u>for medical purposes or needs</u> has decreased, stayed the same, or increased since 2019?

1. Decreased
2. Stayed the same
3. Increased
4. Don't Know

<u>SECTION IV – DEMOGRAPHICS</u>

DQ1. For each of the following age groups, how many people, including yourself, usually live in this home?

a. Under 18
b. 18-64

c. 65 and over
    1. None
    2. 1
    3. 2
    4. 3
    5. 4
    6. 5 or more

[GENERATE HOUSEHOLD_COUNT = 1 if DQ1 SHOW 1 MEMBER ONLY, 2 IF MULTIPLE HOUSEHOLD MEMBERS]

DQ1b. **[SHOW IF HOUSEHOLD_COUNT = 2 & (HQ1=YES, OR CQ1=YES, OR MQ1=YES, or MQ5=YES)]** Which age groups include the person or people in your household who have the medical or health need you indicated earlier? Please select all that apply. **[DISPLAY CATEGORIES BASED ON CATEGORIES WITH 1 OR MORE FROM DQ1].**

a. Under 18
b. 18-64
c. 65 and over
    1. None
    2. 1
    3. 2
    4. 3
    5. 4
    6. 5 or more

DQ2. Please select the range that best describes your household's total annual income.
    1. Less than $10,000
    2. $10,000 - $19,999
    3. $20,000-$24,999
    4. $25,000-$49,999
    5. $50,000-$74,999
    6. $75,000-$99,999
    7. $100,000-$149,999
    8. $150,000-$174,999
    9. $175,000-$199,999
    10. $200,000-$249,999
    11. $250,000 or more
    12. Prefer not to answer

CLOSING

You have completed the survey.

[IF NON-MEDICAL BASELINE AND REPORTED MEDICAL NEED: As a [Utility] customer, you may be eligible for [utility]'s Medical Baseline Program. This program can provide assistance with electricity bills and with safety notifications for households with certain qualifying medical needs.

If you are interested in learning more about the Medical Baseline program, such as the requirements for eligibility or how to apply, please visit the website below or call [utility] at [phone number] to learn more.

[URL]

Thank you for your time and participation. You may exit the survey by closing your browser.

APPENDIX G. SURVEY SAMPLE INFORMATION

The table below shows the total cases sampled from each stratum, the number who completed the EUS Survey, and the completion rate.

Stratum	Sample size	Completed survey	Completion rate
Desert - No Seniors, No Children - CARE/FERA - Not On Medical Baseline	16	6	38%
Desert - No Seniors, No Children - CARE/FERA - On Medical Baseline	6	4	67%
Desert - No Seniors, No Children - Not CARE/FERA - Not On Medical Baseline	10	7	70%
Desert - No Seniors, No Children - Not CARE/FERA - On Medical Baseline	6	3	50%
Desert - Seniors and/or Children - CARE/FERA - Not On Medical Baseline	38	14	37%
Desert - Seniors and/or Children - CARE/FERA - On Medical Baseline	24	13	54%
Desert - Seniors and/or Children - Not CARE/FERA - Not On Medical Baseline	20	10	50%
Desert - Seniors and/or Children - Not CARE/FERA - On Medical Baseline	22	11	50%
Inland - Have Children, No Seniors - CARE/FERA - Not On Medical Baseline	62	25	40%
Inland - Have Children, No Seniors - CARE/FERA - On Medical Baseline	38	19	50%
Inland - Have Children, No Seniors - Not CARE/FERA - Not On Medical Baseline	30	16	53%
Inland - Have Children, No Seniors - Not CARE/FERA - On Medical Baseline	38	22	58%
Inland - Have Seniors, No Children - CARE/FERA - Not On Medical Baseline	108	57	53%
Inland - Have Seniors, No Children - CARE/FERA - On Medical Baseline	98	53	54%
Inland - Have Seniors, No Children - Not CARE/FERA - Not On Medical Baseline	148	85	57%

Stratum	Sample size	Completed survey	Completion rate
Inland - Have Seniors, No Children - Not CARE/FERA - On Medical Baseline	184	123	67%
Inland - No Seniors, No Children - CARE/FERA - Not On Medical Baseline	78	37	47%
Inland - No Seniors, No Children - CARE/FERA - On Medical Baseline	48	27	56%
Inland - No Seniors, No Children - Not CARE/FERA - Not On Medical Baseline	62	39	63%
Inland - No Seniors, No Children - Not CARE/FERA - On Medical Baseline	76	53	70%
Inland - Seniors and Children - CARE/FERA - Not On Medical Baseline	30	15	50%
Inland - Seniors and Children - CARE/FERA - On Medical Baseline	20	10	50%
Inland - Seniors and Children - Not CARE/FERA - Not On Medical Baseline	12	3	25%
Inland - Seniors and Children - Not CARE/FERA - On Medical Baseline	12	6	50%
Mild - Have Children, No Seniors - CARE/FERA - Not On Medical Baseline	28	13	46%
Mild - Have Children, No Seniors - CARE/FERA - On Medical Baseline	20	10	50%
Mild - Have Children, No Seniors - Not CARE/FERA - Not On Medical Baseline	32	14	44%
Mild - Have Children, No Seniors - Not CARE/FERA - On Medical Baseline	36	19	53%
Mild - Have Seniors, No Children - CARE/FERA - Not On Medical Baseline	74	42	57%
Mild - Have Seniors, No Children - CARE/FERA - On Medical Baseline	72	43	60%
Mild - Have Seniors, No Children - Not CARE/FERA - Not On Medical Baseline	154	86	56%
Mild - Have Seniors, No Children - Not CARE/FERA - On Medical Baseline	154	110	71%
Mild - No Seniors, No Children - CARE/FERA - Not On Medical Baseline	48	25	52%
Mild - No Seniors, No Children - CARE/FERA - On Medical Baseline	42	25	60%

Stratum	Sample size	Completed survey	Completion rate
Mild - No Seniors, No Children - Not CARE/FERA - Not On Medical Baseline	58	33	57%
Mild - No Seniors, No Children - Not CARE/FERA - On Medical Baseline	50	36	72%
Mild - Seniors and Children - CARE/FERA - Not On Medical Baseline	12	4	33%
Mild - Seniors and Children - CARE/FERA - On Medical Baseline	12	6	50%
Mild - Seniors and Children - Not CARE/FERA - Not On Medical Baseline	10	6	60%
Mild - Seniors and Children - Not CARE/FERA - On Medical Baseline	12	9	75%
TOTAL	**2,000**	**1,139**	**57%**

APPENDIX H. SURVEY DISPOSITIONS

The table below presents the survey disposition results.

- Ineligible – These cases were not eligible for the survey because the respondent indicated they moved since 2019, did not reside at the address until after 2019 (when the RASS was conducted), were not a valid residence, or the respondent was deceased.

- Not Responsive to Outreach – Cases did not start the survey to confirm eligibility and did not refuse participation. In general, these include cases where multiple phone outreach attempts resulted in no answer, voicemail messages, busy signals, or requests to call back.

- Declined Participation – Cases indicated to an interviewer that they did not want to participate. Most cases were soft refusals and only a small number were strong refusals.

- Partial Completion – The respondent began the survey but did not complete the survey to the final demographics section.

- Complete – The respondent completed the full survey to the final demographics section.

Based on the final disposition outcomes, the estimated eligibility rate was 96 percent, the cooperation rate was 90 percent, and the estimated response rate was 59 percent.[36]

Dispositions	Count	Percent
Ineligible	49	2%
Not Responsive to Outreach	683	34%
Declined Participation	97	5%
Partial Complete	32	2%
Completed Survey	1,139	57%
Online (Phone or Small Device)	298	15%
Online (PC or Desktop)	329	16%
By Phone	512	26%
TOTAL	2,000	100%

[36] The eligibility rate was calculated as: All known eligible / [all known eligible + ineligible]. The cooperation rate was calculated as: complete / all known eligible]. The response rate was calculated as: complete / [(all known eligible) + (eligibility rate * not responsive to outreach)].

Dispositions	Count	Percent
Eligibility Rate	NA	96%
Cooperation Rate	NA	90%
Response Rate	NA	59%

Note: The eligibility rate was calculated as: All known eligible / [all known eligible + ineligible].

The cooperation rate was calculated as: complete / all known eligible].

The response rate was calculated as: complete / [(all known eligible) + (eligibility rate * not responsive to outreach)].

APPENDIX I. EUS WEB TOOL USER GUIDE

FINAL REPORT

Essential Use of Electricity Study

Prepared for Southern California Edison, Pacific Gas and Electric Company, and San Diego Gas & Electric Company

Date: March 31, 2023

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8 ESSENTIAL USE OF ELECTRICITY STUDY (EUS) WEB TOOL USER GUIDE

8.1 Background of Essential Use Study

The California electric Investor-Owned Utilities (IOUs), including Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), engaged DNV to conduct the Essential Use Study (EUS) as ordered by CPUC Decision 18-08-013. The EUS developed data and constructed a web tool to provide users the ability to define what household electricity usage is essential and to explore and evaluate the estimated usage across differently situated customers throughout California.

The EUS is based on data from the 2019 California Residential Appliance Saturation Survey (RASS) and primary data collection via qualitative interviews and a supplemental survey to the RASS survey. The interviews explored the issues surrounding essential use and potential energy underutilization by low- to moderate -income households and households participating on a medical baseline rate (additional energy purchased at the lowest tier pricing). The surveys investigated incremental electricity usage for heating and cooling to mitigate medical needs and the use of electric equipment for medical conditions.

The study's primary deliverables included a final report and a publicly available web tool that produces estimates of the electric essential use consumption and the average total household consumption for seasonal (summer, winter) and annual time periods. The web tool user selects electric end-uses to be included in the essential use estimate and chooses geographic and demographic characteristics to refine the population of interest.

The study's scope of work was developed in consultation with its stakeholders: the Center for Accessible Technology (CforAT), the Public Advocates Office at the California Public Utilities Commission (Cal Advocates), and The Utility Reform Network (TURN).

The EUS Final Report is available on the CALMAC database (https://www.calmac.org/search.asp) and from the web tool landing page.

8.2 Access to the Web Tool

8.2.1 Web URL

The EUS Web Tool can be accessed through the following web link:

https://caessentialuse.dnv.com

The EUS Web Tool where users design and run a scenario is only accessible to registered users. The home page (linked above) includes a link to initiate the registration process. New users should click on the "Register Here" link on the home page to activate the Registration process. Returning users do not need to re-register and can directly proceed to login.

Registration is not required to download EUS-related documents via links soon-to-be located on the Home page below the Login area. The documents will be posted as they become available.

Figure 3 is a screen shot of the Home page and **Figure 4** is a magnified version of the location of the Registration link.

Figure 3: Home page with Login and Registration link

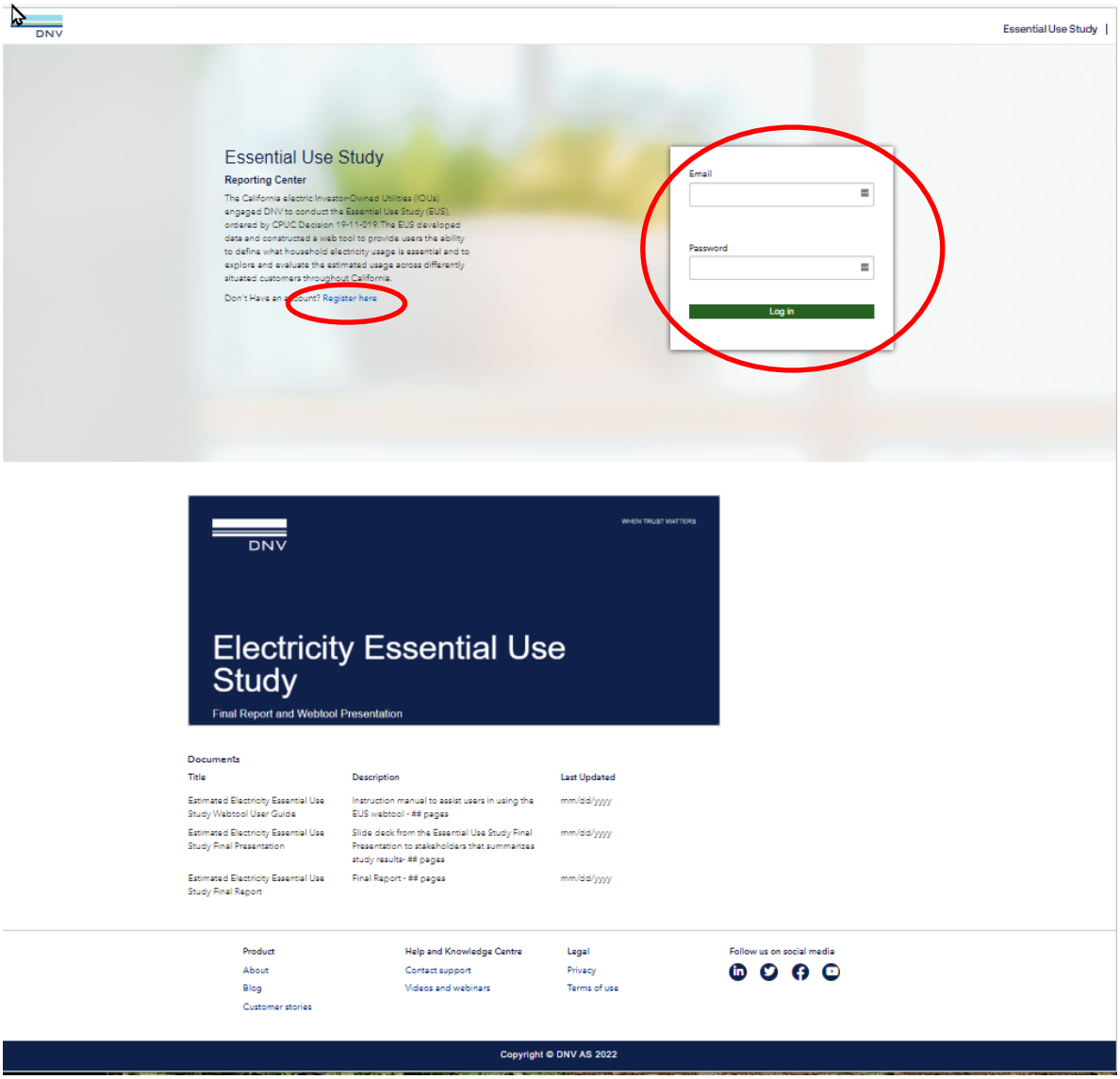
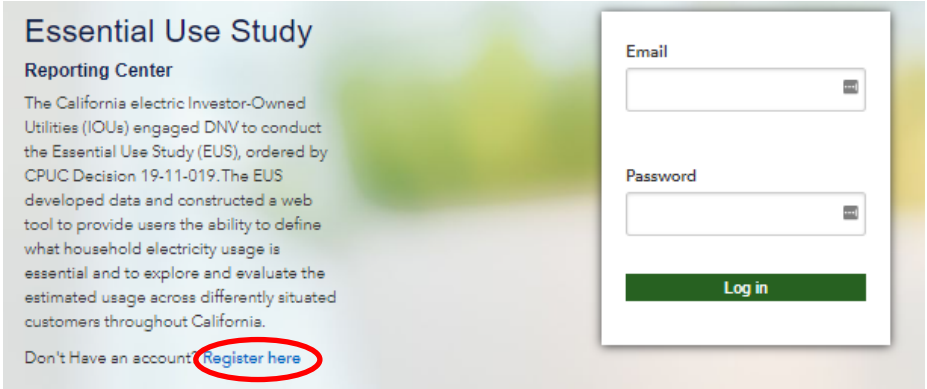


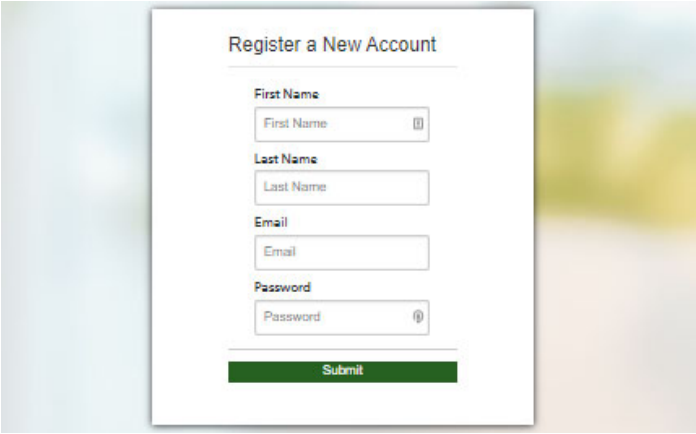
Figure 4. Registration link



8.2.2 Registration

As shown on the Registration page in **Figure 5**, the user will be asked to provide a valid email address and to create a password. An email address is required but will only be used for authenticating the registration process and resetting the password at the user request.

Figure 5. Registration Page



8.2.3 Login

Registered users will enter the email and password used in the registration process to login to the EUS Web Tool, as shown in **Figure 6**. Once logged in, the Home page will refresh, and show an area describing and linking to the Design Scenario area of the EUS Web Tool.

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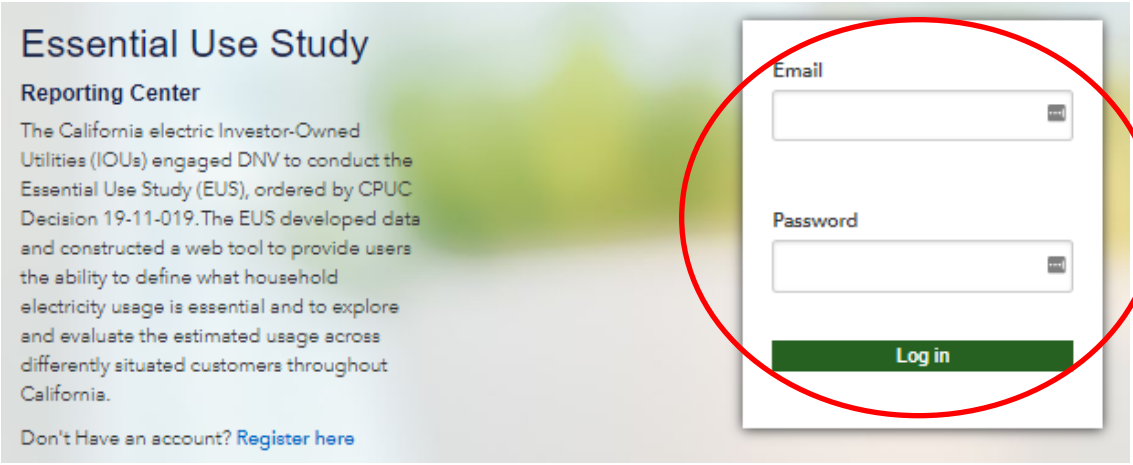
Figure 6. Login area



8.2.4 Home Page (after Login)

After a user successfully logs in to the Web Tool, they can navigate to query the EUS data by clicking on the **Design Scenario** tab near the top of the page or on the **Go to Design Scenario** link. **Figure 7** shows the location of the links to Design Scenario.

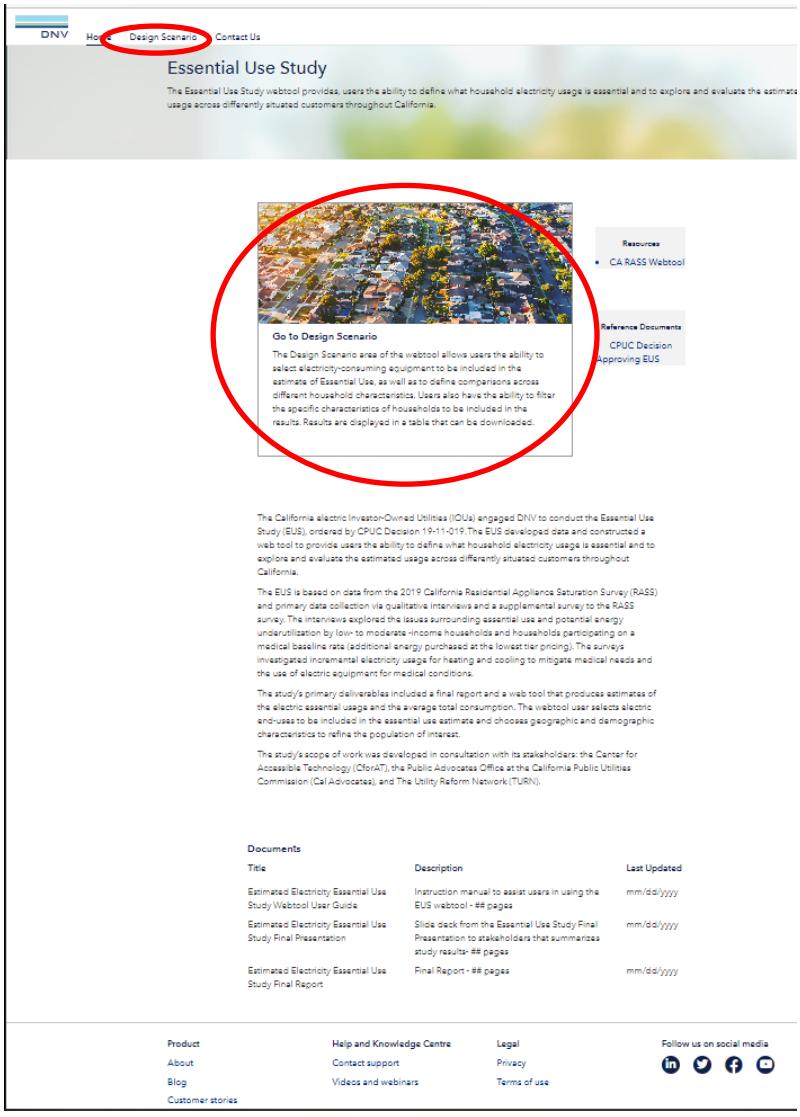
The “Resources” area contains links to related projects and web tools.

The “Reference Documents” area contains links to downloadable documents specific to EUS.

The “Documents” area will contain links to download the CA Essential Use Study documents. Descriptions and last updated dates are also included in this area. The documents will be posted as they become available.

A user can click “Log out “on top right to log out of the web tool.

Figure 7. Home Page (after login)



8.3 How to Design Scenario to query the EUS Data

Clicking on the **Design Scenario** tab at the top of the Home page or clicking on the **Go to Design Scenario** link in the middle of the Home page will take a user to the Design Scenario page, where they can configure the analysis of EUS data.

There are three steps to designing a scenario to query the EUS data.

7. Select components of electric essential use.
8. Create comparisons and specify households.
9. Choose results options.

This section outlines each step of the design scenario process.

8.3.1 Step 1: Select components of electric essential use

8.3.1.1 Default Essential Use Consumption

By default, Essential Use Consumption includes estimated usage for the first refrigerator and interior lighting. If a user does not select any additional types of equipment, the Essential Use Consumption will display the electricity usage of the first refrigerator plus usage for interior lighting. A user cannot remove either the first refrigerator or indoor lighting from essential use. Because the majority of respondents indicated in the 2019 RASS that household water was heated using natural gas or propane, water heating is not included as part of the default essential use of electricity. Web tool users can include electric water heating as part of their user-defined essential use of electricity.

8.3.1.2 Electric equipment types

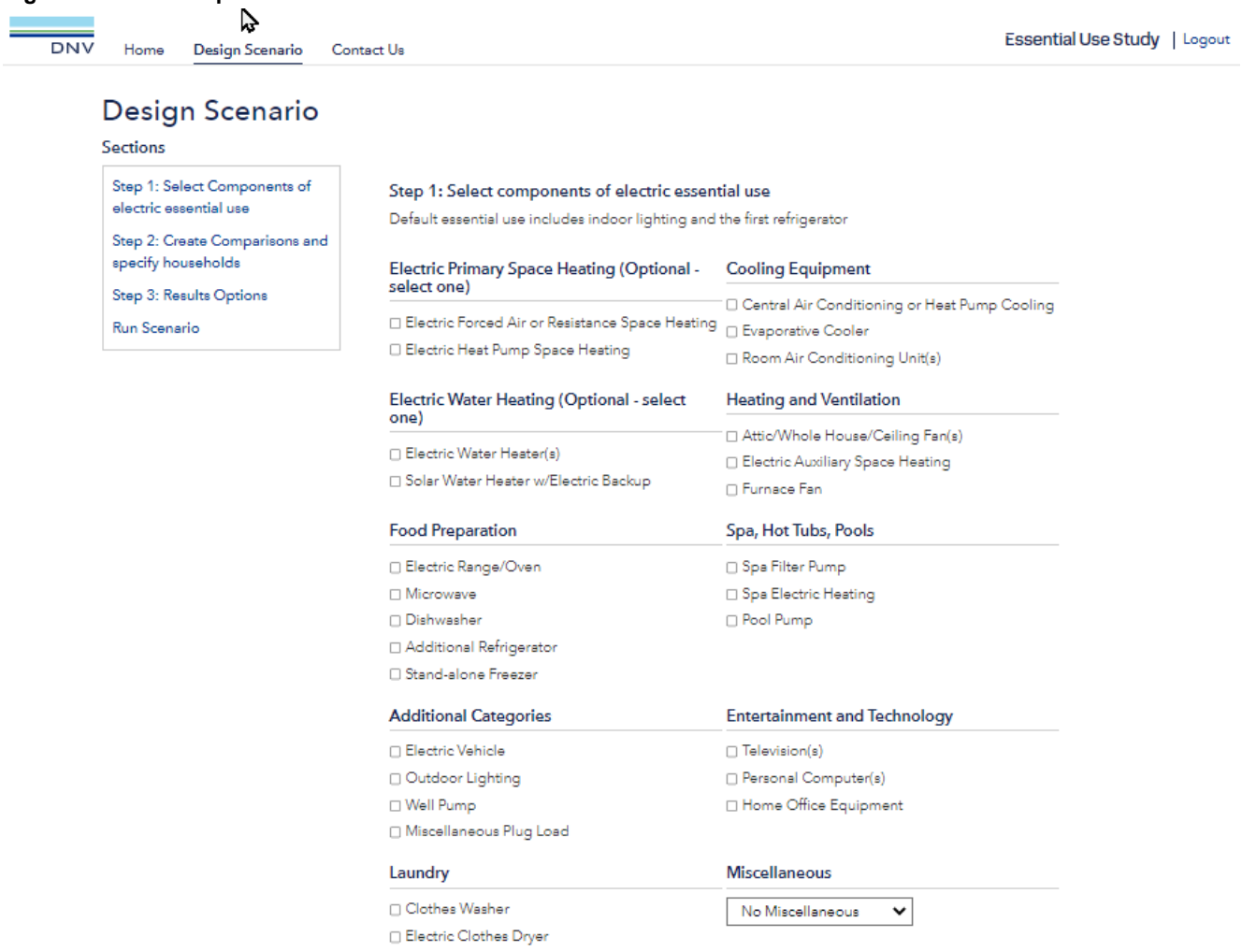
Users can create their own definition of Essential Use Consumption of electricity by selecting electric equipment (end uses) to include in essential usage, beyond the default outlined above. Selections are made by clicking on the checkbox next to the item or by using the drop-down menu for Miscellaneous. The Miscellaneous (plug load) is available in increments of 10% (on a scale of 0% to 100%) for a user to include in Essential Use Consumption. Electric usage attributed to medical devices is contained in the Miscellaneous plug load category.

Figure 8 shows the categories of equipment available for users to select to be included in the Essential Use Consumption.

Users can select as many appliances as they choose, but each piece of equipment is **additive** to the default essential usage. As more electric appliance categories are selected, the calculated Essential Use Consumption will increase.

For example, if a user selects both electric water heating and solar water heating with electric backup, usage for both will be added so the resulting essential usage estimate would reflect usage for a household that would have both types of electric water heating (unlikely).

Figure 8 Select components to include in Essential Use



All user-selected electric equipment categories will be included as part of the Essential Use Consumption calculation outputs and are additive. The more electric appliance categories that are selected, the greater the calculated essential use will be.

Note: Users are recommended to select **only one** type of:

- Primary Heating (Conventional Electric Heat **or** Electric Heat Pump)
- Water Heating (Electric Water Heating **or** Solar Water Heater with Electric Backup)

Users should use care in selecting Cooling Equipment as they are able to select multiple types of Cooling Equipment. The resulting Essential Use estimate will include usage for the "stacked" combination the user selected, i.e., estimate will be for households that have **both** Central AC and Evaporative Cooling if they are both selected. Combinations of cooling equipment may represent the types of cooling necessary in warmer regions but may not reflect the typical cooling equipment present in cooler regions where a single type is more common than combinations of types.

8.3.2 Step 2: Create comparisons and specify households

This step allows users to decide how they would like to compare Essential Use Consumption and Total Household Consumption between groups or what attributes they would like to define by rows in the scenario, i.e., how to “slice” the population of households. Users can also select a specific subset of households to analyze using the Filters feature.

8.3.2.1 Create comparisons

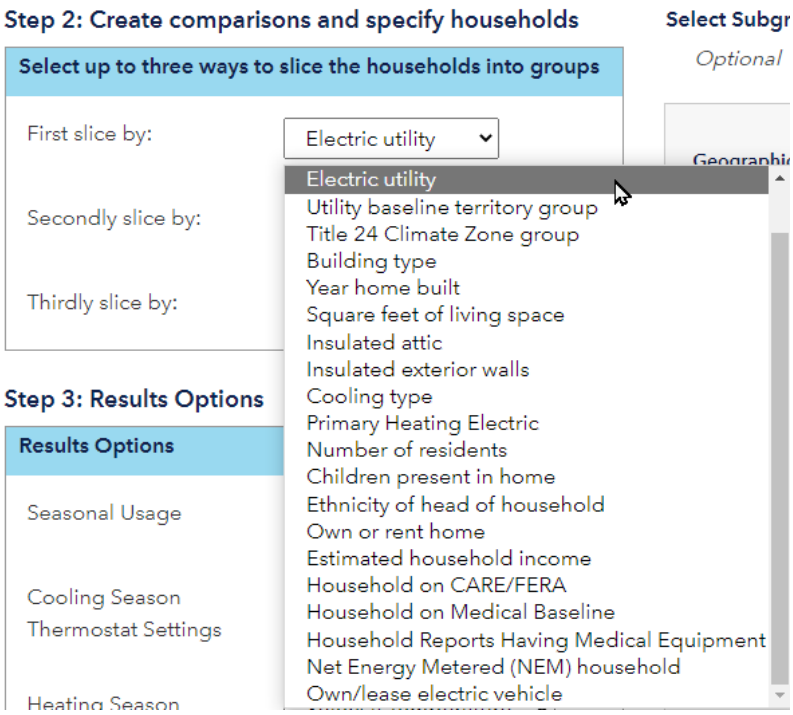
The scenario analysis requires a minimum of one comparison to be selected. The default scenario slices the results by Electric Utility. A user can keep the comparison of Electric Utility or select a different way to slice the groups by using the drop-down menus. A user can select up to three ways to slice the results to compare across groups.

Users can select from one to three of the following categories to segment or slice households into groups (rows) in the table of results:

- Electric utility
- Utility baseline territory group
- CEC Title 24 Climate Zone group
- Building type
- Year home built
- Square feet of living space
- Insulated attic
- Insulated exterior walls
- Cooling type
- Primary Heating Electric
- Number of residents
- Children present in home
- Ethnicity of head of household
- Own or rent home
- Estimated household income
- Household on CARE/FERA
- Household on Medical Baseline
- Household Reports Having Medical Equipment
- Net Energy Metered (NEM) household
- Own/lease electric vehicle

The “Slice by” fields define the rows in the results table for the scenario. **Figure 9** shows the drop-down menu of options for slicing categories . For example, if “Electric Utility” is selected as a “slice by” field, the results table will display a row with essential usage and total household usage estimates for each electric utility. The default number of “slice by” categories is one, but a user can select up to three. Each category has two or more values that will be displayed as rows. As the number of categories selected increases, the EUS data is “sliced” into a greater number of sub-groups or rows (more slices). As the number of rows increase, the sample sizes for each sub-group or row decrease (thinner slices).

Figure 9. Create comparisons – Group by rows in report



If the sample size (that is, the number of households from the RASS billing data from which the usage estimate is formulated) for a sub-group falls below 25, the values of the EUS calculation for that sub-group are not shown. This is because small sample sizes do not provide sufficient statistical power to generate household estimates of energy use. The user will see the sample size and the population the sample represents but will not see the results for that row. However, the "Total" row at the bottom of the results table includes all the households from the rows, i.e., includes households that are too small of a sample to show results in a separate row (fewer than 25).

Baseline Territory groups

Each utility defines geographic areas called baseline territories or regions. The baseline territories are one factor the utilities consider when they assign a monthly allowance (baseline allocation) of energy that residential customers can purchase at the lowest price. For the EUS and some other purposes, the Baseline Territories are collapsed into a smaller number of groups. The EUS Web Tool provides the Utility Baseline Territory Group as a way for users to "slice" the data. **Table 6** shows how the baseline territories are aggregated into baseline territory groups.

Table 6 Utility baseline territory group to utility baseline territory mapping

Utility baseline territory group	Utility baseline territories
PG&E Cool	T, V and Z
PG&E Warm	Q, X and Y
PG&E Hot	P, R, S and W
PG&E Unknown	Unknown
SCE Cool	6, 8 and 16
SCE Moderate	5 and 9
SCE Hot	10, 13, 14 and 15
SCE Unknown	Unknown
SDG&E Cool	Coastal
SDG&E Moderate	Inland
SDG&E Hot	Mountain and Desert
SDG&E Unknown	Unknown

CEC Climate Zone groups

The California Energy Commission (CEC) has defined geographic areas called Building Code Climate Zones (T24 Climate Zones). These T24 Climate Zones are used for implementing the Building Energy Efficiency Standards (Title 24, Parts 6 and 11). For the EUS, the Title 24 Climate Zones are collapsed into a smaller number of groups. The EUS Web Tool provides the Climate Zone Group as a way for users to “slice” the data. Table 5-3 shows how Title 24 Climate Zones are aggregated up to Climate Zone Groups.

Table 7. CEC Climate Zone Group to CEC T24 Climate Zone Mapping

CEC Climate Zone Group	CEC Title 24 Climate Zones
Coastal	1, 2, 3, 4, 5, 6 and 7
Inland	8, 9, 10, 11, 12 and 13
Desert	14 and 15
Mountain	16

8.3.2.2 Specify Households

By default, all households are included in the analysis. A user can choose to select specific types of households to be included in the analysis by using the Filters functionality. The categories available as Filters are the same categories available as Group by fields.

The Filters section is on the right side of the Design Scenario page. A user can click on each category to open the accordion to view the list of attributes available to select. By default, all items are included, but the checkboxes appear unchecked.

The EUS Web Tool provides Geographic characteristics, Building Characteristics and Household Characteristics for users to help specify their desired population. **Table 8** shows the characteristics and available values for the Filters.

Table 8: Characteristics and values to specify households to be included in analysis

Geographic Characteristics	
Electric utility	PG&E SCE SDG&E
Utility baseline territory	PG&E (P, Q, R, S, T, V, W, X, Y, Z, Unknown) SCE (5, 6, 8, 9, 10, 13, 14, 15, 16, Unknown) SDG&E (Coastal, Desert, Inland, Mountain, Unknown)
Utility baseline territory group	PG&E (Cool, Warm, Hot, Unknown) SCE (Cool, Moderate, Hot, Unknown) SDG&E (Coastal, Desert, Inland, Mountain, Unknown)
Title 24 Climate Zone	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
Title 24 Climate Zone group	Coastal (1,2,3,4,5,6,7) Inland (8,9,10,11,12,13) Desert (14,15) Mountain (16)
Building Characteristics	
Building type	Single Family Detached Townhouse, Duplex, Or Row House Apartment Or Condo (2-4 Units) Apartment Or Condo (5+ Units) Mobile Home
Year home built	Before 1975 1975-1978 1979-1983 1984-1991 1992-1999 2000-2005 2006-2012 2013-2019

Square feet of living space	Less than 500 500-750 751-1000 1001-1250 1251-1500 1501-2000 2001-2500 2501-3000 More than 3000
Insulated attic	Yes, No, Unknown
Insulated exterior walls	Yes, No, Unknown
Cooling type	Central Air Conditioning System or Heat Pump Cooling Only Central Evaporative Cooler Only Room Air Conditioning Unit(s) Only Multiple Air Conditioning Systems No Cooling Unknown
Primary Heating Electric	Yes, conventional electric heat Yes, electric heat pump No
Household Characteristics	
Number of residents	One Two Three Four Five or More
Children present in home	Yes, No, Unknown
Ethnicity of head of household	American Indian AK Native Asian Pacific Islander Black African American Hispanic Latino White Caucasian Other Mixed Unknown
Own or rent home	Own, Rent, Unknown
Estimated household income	Less than $25K $25K-49K $50K-74K $75K-99K $100K-149K $150K-199K Over $200K Unknown
Household on CARE/FERA	Yes, CARE Yes, FERA No Unknown
Household on Medical Baseline	Yes, No, Unknown
Household Reports Having Medical Equipment	Yes, No

Net Energy Metered (NEM) household	Yes, No
Own/lease electric vehicle	Yes, No

A user can refine their output report to a specific population of households with the use of filters. A user specifies their population by the checking the box next to the value they want to include. For example, if a user checks the filter box for **Electric Utility > PG&E**, then only households with Electric Utility equal to PG&E will be used in calculation of the results.

Note: If a user groups by electric utility and filters to keep only PG&E, then the output report will only show values for PG&E and not include the other electric utilities.

Figure 10 shows the location of the Filters feature.

Figure 10. Specify Households – Filter area with accordions collapsed

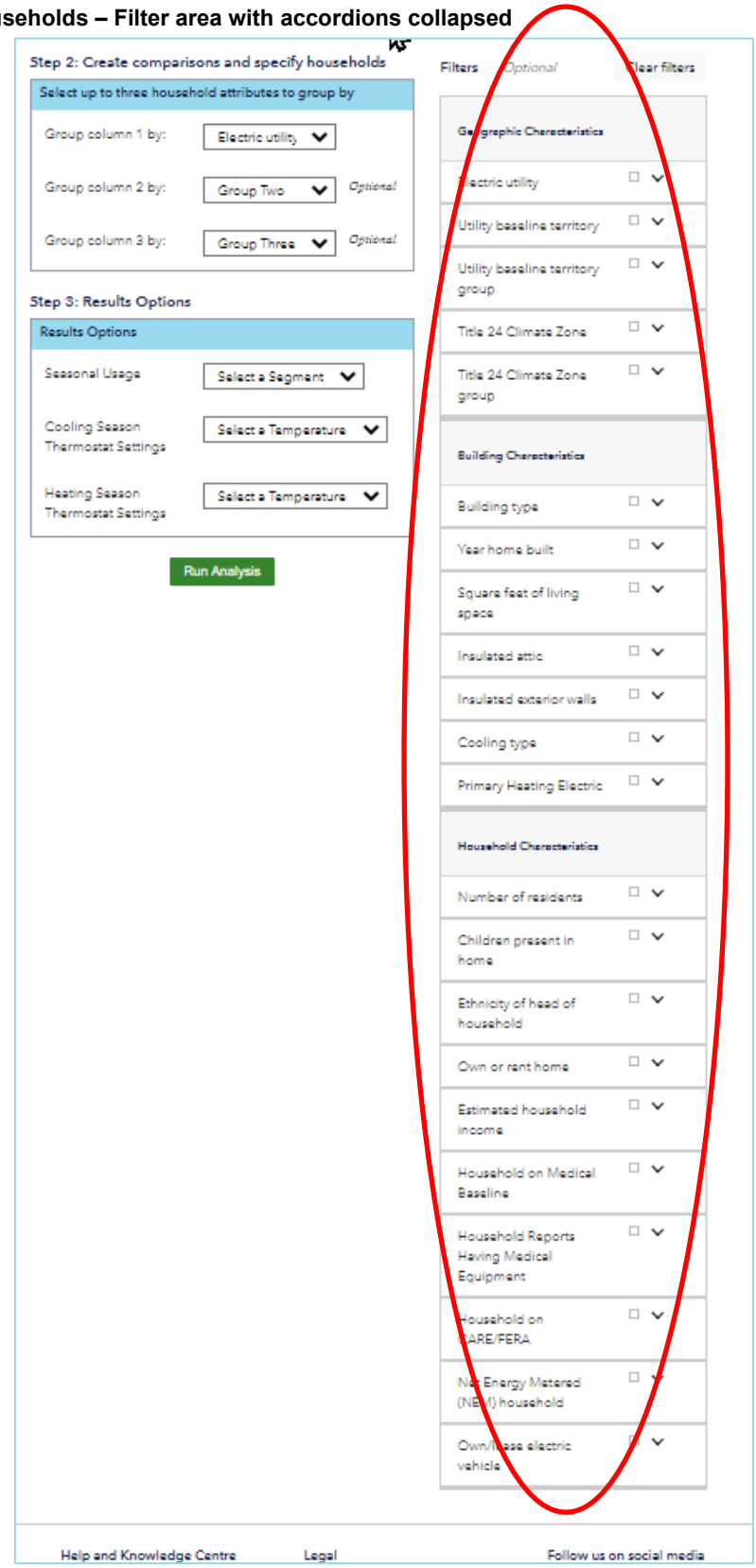
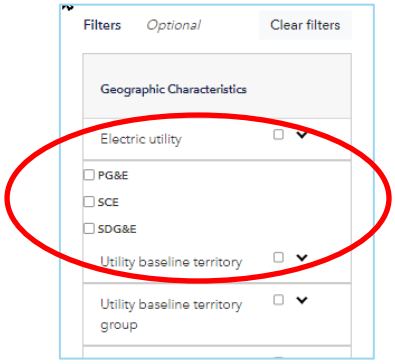


Figure 11 shows the expanded view of the accordion menu for Electric Utility in the Filters section.

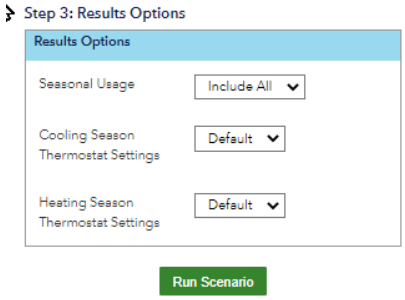
Figure 11: Specify Households – Filter area for Electric utility expanded



8.3.3 Step 3: Choose Results Options

Users can specify the type of results they would like to see as well as set specific thermostat settings for the cooling season and heating season in the Results Options area. **Figure 12** shows the Results Options section of the Design Scenario area.

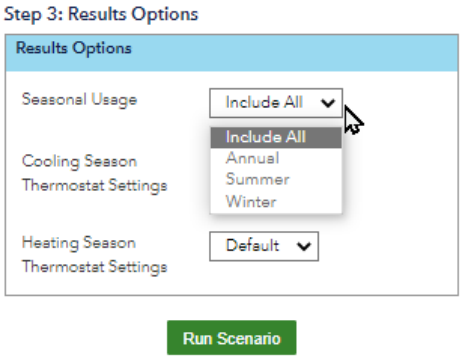
Figure 12. Seasonal Usage and Thermostat Settings



8.3.3.1 Seasonal Usage

As shown in **Figure 13**, users can select whether the essential use values are reported over an annual, summer or winter usage periods. By default, the Web Tool will display all three seasonal usages: annual, summer and winter.

Figure 13: Seasonal usage menu expanded



8.3.3.2 Thermostat Settings

The EUS Web Tool makes the option available for users to select Cooling Season and Heating Season Thermostat settings as an indicator of what the user wants to model as the essential use thermostat setting. By default, the web tool uses the thermostat settings as specified by the household in the RASS survey.

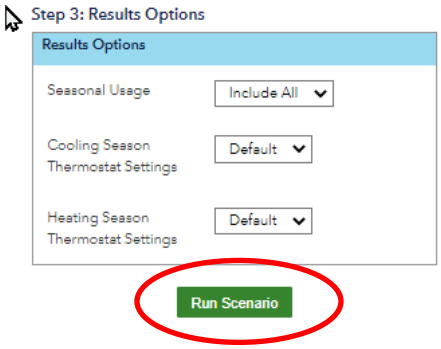
In general, as the thermostat setting increases in the cooling season, the calculated estimates of essential use will decrease. The opposite is also true, as thermostat setting decreases in the cooling season, the calculated estimates of essential use will increase.

The inverse is true during the heating season. As thermostat settings increase in heating season, the calculated estimates of essential use will increase. And as the thermostat settings decrease in the heating season, the calculated estimates of essential use will decrease..

8.3.4 Run Scenario

After the user completes making their selections, they may click on Run Analysis (**Figure 14**) to generate an Output Report table that will open in a new browser tab. Each time the user runs an analysis, the results will open in an additional new tab in the browser window.

Figure 14: Run Scenario button



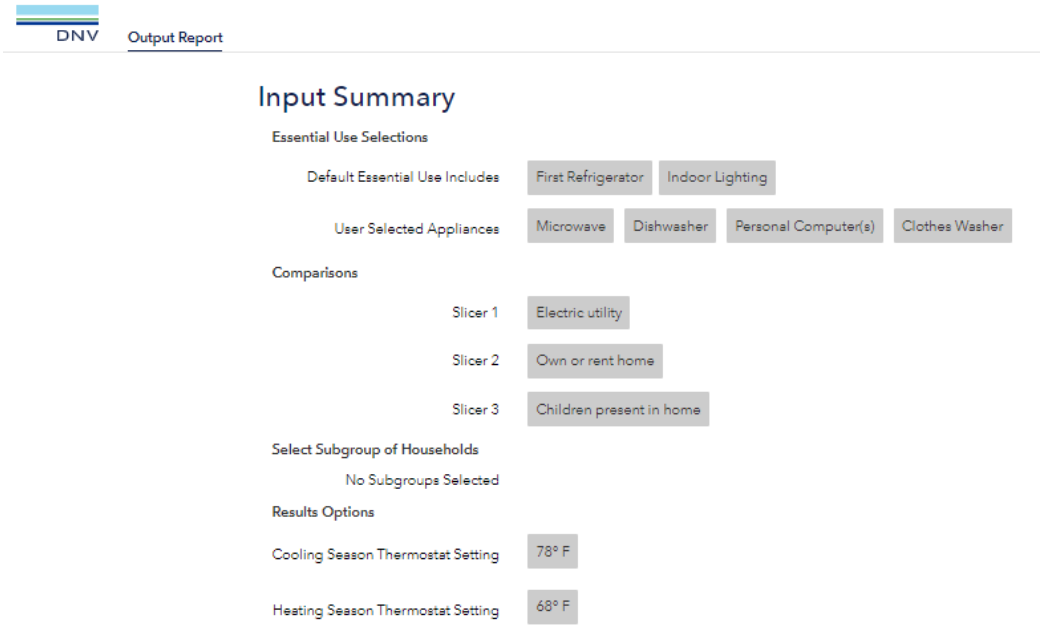
8.4 Output Report

The Output Report will open in a new tab in the browser window. Each analysis opens in a new tab, so the user can adjust the analysis and produce a new set of results without losing the previous analysis. The output report has two sections-- the Input Summary and the Results Table.

8.4.1 Input Summary

The Input Summary section of the Output Report outlines the default and user-selected electric equipment included in the essential use estimates, as well as lists the characteristics used to slice the results and the filters applied to define what households are included in the analysis. The results options also lists the user selection for seasonal usage and thermostat settings for heating and cooling seasons. **Figure 15** shows an example of the Input Summary.

Figure 15: Output Report -- Input Summary



8.4.2 Results Table

The Results Table displays the estimated Essential Use Consumption based on the user inputs and the Total Household Consumption for the sample comprising each row. Confidence intervals at the 90% level are presented for each estimate. Sample size and population represented by that sample are provided for each row. **Figure 16** shows and example Results Table in the Output Report.

Figure 16: Output Report -- Results Table with Building Type (Single Family Detached) filter applied

Electric utility	Own or rent home	Children present in home	Estimated Essential Use Consumption						Total Household Consumption						Sample Size	Population Represented
			Winter		Summer		Annual		Winter		Summer		Annual			
			kWh	+/-	kWh	+/-	kWh	+/-	kWh	+/-	kWh	+/-	kWh	+/-		
PG&E	Own	Yes	1,697	18.3	858	8.8	2,555	27.1	5,260	110.2	3,148	78.0	8,408	178.6	2,337	802,125
		No	1,529	11.5	779	5.9	2,308	17.3	4,637	69.1	2,794	47.9	7,431	112.2	7,006	1,675,742
		Unknown	1,526	77.3	778	41.9	2,304	119.0	3,699	359.4	2,065	223.3	5,764	577.0	233	34,330
	Rent	Yes	1,669	40.8	836	19.7	2,505	60.3	4,505	222.5	2,905	177.2	7,409	373.0	382	241,023
		No	1,500	38.8	758	19.5	2,258	58.1	3,723	194.9	2,357	168.2	6,080	347.5	525	194,301
		Unknown	1,679	144.2	845	64.9	2,524	209.1	2,858	250.9	1,672	340.5	4,530	585.9	35	6,918
	Unknown	Yes	1,741	123.3	874	58.1	2,614	180.9	4,964	831.2	3,239	746.6	8,203	1389.5	30	9,503
		No	1,372	83.4	703	47.2	2,074	130.4	4,431	568.2	2,814	337.0	7,245	873.8	67	13,384
		Unknown	1,552	95.3	789	42.4	2,341	137.8	2,664	26.3	1,302	18.8	3,966	44.7	263	39,050
SCE	Own	Yes	1,681	19.2	855	9.3	2,536	28.4	5,028	114.5	3,355	94.3	8,383	200.9	2,254	879,581
		No	1,528	11.9	783	6.1	2,311	17.9	4,608	83.2	3,171	81.2	7,779	160.2	5,500	1,408,318
		Unknown	1,546	64.3	794	35.2	2,339	99.2	4,363	1205.0	3,077	1373.3	7,440	2574.3	142	29,279
	Rent	Yes	1,699	46.1	856	21.4	2,555	67.4	3,909	172.2	2,683	143.1	6,592	300.8	389	225,552
		No	1,493	40.5	758	19.8	2,251	60.1	3,446	225.1	2,405	183.5	5,851	398.4	375	164,638
		Unknown													20	6,743
	Unknown	Yes	2,017	167.2	1,010	76.3	3,027	243.0	5,496	705.3	3,562	542.3	9,059	1169.0	27	16,942
		No	1,449	72.4	747	35.6	2,196	107.8	4,206	347.2	2,917	344.4	7,123	672.2	66	11,888
		Unknown	1,590	166.9	808	74.7	2,398	241.6	2,682	104.9	1,369	81.1	4,050	179.4	161	14,524
SDG&E	Own	Yes	1,428	29.0	1,033	19.8	2,461	48.8	4,378	181.6	3,329	138.2	7,707	317.7	733	190,595
		No	1,287	15.8	939	11.2	2,226	26.9	3,720	119.7	2,826	81.9	6,545	200.3	1,994	372,164
		Unknown	1,511	184.0	1,084	120.8	2,595	304.7	3,806	2029.5	2,811	1552.8	6,617	3582.2	63	9,042
	Rent	Yes	1,336	46.7	964	32.6	2,301	79.3	3,077	206.8	2,298	163.5	5,375	364.5	129	48,564
		No	1,227	41.5	888	29.7	2,115	71.0	2,636	146.3	1,972	122.2	4,608	265.8	159	46,155
		Unknown													9	1,886
	Unknown	Yes													8	3,523
		No													20	1,363
		Unknown	1,223	53.3	894	37.5	2,117	90.7	2,148	103.1	1,508	76.1	3,655	179.1	88	4,660
		Total					2,384	9.4					7,522	67.2	23,015	6,451,797.192

8.4.3 Data Displayed

Results are shown for all rows with estimates based on 25 or more households, as listed in the “Sample Size” column of the table. Rows with results based on fewer than 25 households will not display the usage estimates but will show the sample size and population represented by that row.

Electric Utility is required to be a slicer for the seasonal usage (summer, winter) to be shown for accuracy purposes. This requirement is in place because the electric utilities define the seasons differently – SDG&E has an additional month included in their definition of summer, and one fewer month in their definition of winter, as compared to how PG&E and SCE define their summer and winter seasons for allocating baseline usage. Thus, the Total row at the bottom of the Results table will not display the seasonal usage, to avoid combining estimates covering varying time periods.

When a user groups and filters on the same characteristic, the rows representing subsets the user has not included in the analysis will be omitted in the results table. For example, if the user applied a filter to only include “Children Present in Home” equal to Yes and No (omitting the “Unknown” category), the results table would omit the rows representing results for Unknown whether children are present in the home.

Figure 17 shows an example of the Results Table with Filters applied.:

Figure 17: Output Report -- Results Table with Building Type (Single Family Detached) and Children Present (Yes & No) filters applied

Electric utility	Own or rent home	Children present in home	Estimated Essential Use Consumption						Total Household Consumption						Sample Size	Population Represented
			Winter		Summer		Annual		Winter		Summer		Annual			
			kWh	+/-	kWh	+/-	kWh	+/-	kWh	+/-	kWh	+/-	kWh	+/-		
PG&E	Own	Yes	1,697	18.3	858	8.8	2,555	27.1	5,260	110.2	3,148	78.0	8,408	178.6	2,337	802,125
		No	1,529	11.5	779	5.9	2,308	17.3	4,637	69.1	2,794	47.9	7,431	112.2	7,006	1,675,742
	Rent	Yes	1,669	40.8	836	19.7	2,505	60.3	4,505	222.5	2,905	177.2	7,409	373.0	382	241,023
		No	1,500	38.8	758	19.5	2,258	58.1	3,723	194.9	2,357	168.2	6,080	347.5	525	194,301
	Unknown	Yes	1,741	123.3	874	58.1	2,614	180.9	4,964	831.2	3,239	746.6	8,203	1389.5	30	9,503
		No	1,372	83.4	703	47.2	2,074	130.4	4,431	568.2	2,814	337.0	7,245	873.8	67	13,384
SCE	Own	Yes	1,681	19.2	855	9.3	2,536	28.4	5,028	114.5	3,355	94.3	8,383	200.9	2,254	879,581
		No	1,528	11.9	783	6.1	2,311	17.9	4,608	83.2	3,171	81.2	7,779	160.2	5,500	1,408,318
	Rent	Yes	1,699	46.1	856	21.4	2,555	67.4	3,909	172.2	2,683	143.1	6,592	300.8	389	225,552
		No	1,493	40.5	758	19.8	2,251	60.1	3,446	225.1	2,405	183.5	5,851	398.4	375	164,638
	Unknown	Yes	2,017	167.2	1,010	76.3	3,027	243.0	5,496	705.3	3,562	542.3	9,059	1169.0	27	16,942
		No	1,449	72.4	747	35.6	2,196	107.8	4,206	347.2	2,917	344.4	7,123	672.2	66	11,888
SDG&E	Own	Yes	1,428	29.0	1,033	19.8	2,461	48.8	4,378	181.6	3,329	138.2	7,707	317.7	733	190,595
		No	1,287	15.8	939	11.2	2,226	26.9	3,720	119.7	2,826	81.9	6,545	200.3	1,994	372,164
	Rent	Yes	1,336	46.7	964	32.6	2,301	79.3	3,077	206.8	2,298	163.5	5,375	364.5	129	48,564
		No	1,227	41.5	888	29.7	2,115	71.0	2,636	146.3	1,972	122.2	4,608	265.8	159	46,155
	Unknown	Yes													8	3,523
		No													20	1,363
		Total					2,384	9.5					7,574	67.2	22,001	6,305,363.615

Note that the rows with the Children Present equal to Unknown have been deleted when the additional filter is applied. The sample size for the Total row reflects the omission of the “Unknown” for Children Present – the sample was reduced from 23,015 to 22,001 when the additional filter is applied.

8.4.4 Total Household Consumption

The Total Household Consumption represents the average consumption across the subset of households included in that row. The average is calculated as the Total Household Consumption across households that have different combinations of equipment. For example, some households will have dishwashers, some will not. Some households will have spa filter pumps and spa heaters, and some will not. The average Total Household Consumption only looks at the total for each household but does not break it down into specific types of equipment.

Total Household Consumption stays the same for the type of households (slices) regardless of what categories of equipment the web tool user selects to include in the Essential Use Consumption. If a user runs two scenarios by changing the type of equipment to include in the Essential Use Consumption but not changing the way to slice the households by type, the Total Household Consumption will not change but the Essential Use Consumption will change because different sets of equipment types were selected for each scenario. For example, if a user runs the first scenario by selecting a dishwasher to be included in the Essential Use Consumption, and adds central cooling to the Essential Use Consumption for

the second scenario, the values of the estimated the Essential Use Consumption would change, but the values for the Total Household Consumption would remain the same as long as the user did not change the types (slices) of households.

Total Household Consumption will vary across scenarios where the web tool user selects different ways to slice the households into different types. If a webtool user selects the same categories of equipment to include in the Essential Use Consumption for two scenarios, but selects an additional way to slice the households, the Total Household Consumption will change. For example, if a user selects Electric Utility as a slicer in the first scenario but selects both Electric Utility and Building Type as slicers in the second scenario, the Total Household Consumption will be different for the scenarios because the Total Household Consumption is being calculated for different subsets of households in each scenario.

Note: Sum of Winter and Summer Total Household Consumption will be equal to annual consumption.

8.4.5 Estimated Essential Use Consumption

By default, essential use includes the first refrigerator and interior lighting. If a user has not selected any additional types of equipment, the Essential Use Consumption will display the electricity usage of the first refrigerator plus usage for interior lighting.

For each of the additional types of equipment a user selects to include in the Essential Use Consumption, the average usage (kWh) will be calculated for the subset of households in that row that have that type of equipment. The average usage will be added to the default to create the estimated Essential Use Consumption for that row. The usage will be summarized by seasonal usage according to the seasonal estimates of each type of equipment.

For example, if a user elects to include dishwashers in Essential Use Consumption, the average usage for dishwashers will be calculated for households in the row that have dishwashers. The average use for dishwashers will be added to the Default Essential Use to represent the Essential Use Consumption of households that have dishwashers.

It is possible that the estimated Essential Use Consumption may be higher than Total Household Consumption based on the end uses a user selects. This can happen because the Essential Use Consumption is additive for the categories of equipment, whereas the Total Household Consumption is an average consumption of all households of the same type and includes all categories of equipment.

8.4.6 Confidence Interval

Each column within the estimated Essential Use Consumption and Total Household consumption includes a confidence interval represented as a +/- in kWh. Confidence Intervals are calculated at the 90% level.

8.4.7 Sample Size and Population Represented

The sample size shows the number of households included in the row, as defined by the grouping field selected by the user. The population represented shows the population of households represented by the sample sizes. The population represented is calculated by applying the sample weights for each household. The sample weights were developed under the 2019 RASS project and are unique to each household based on various characteristics. The sample weights per household vary from representing a population of under 10 households to representing almost 15,000 households.

8.4.8 Download Output Report as csv file

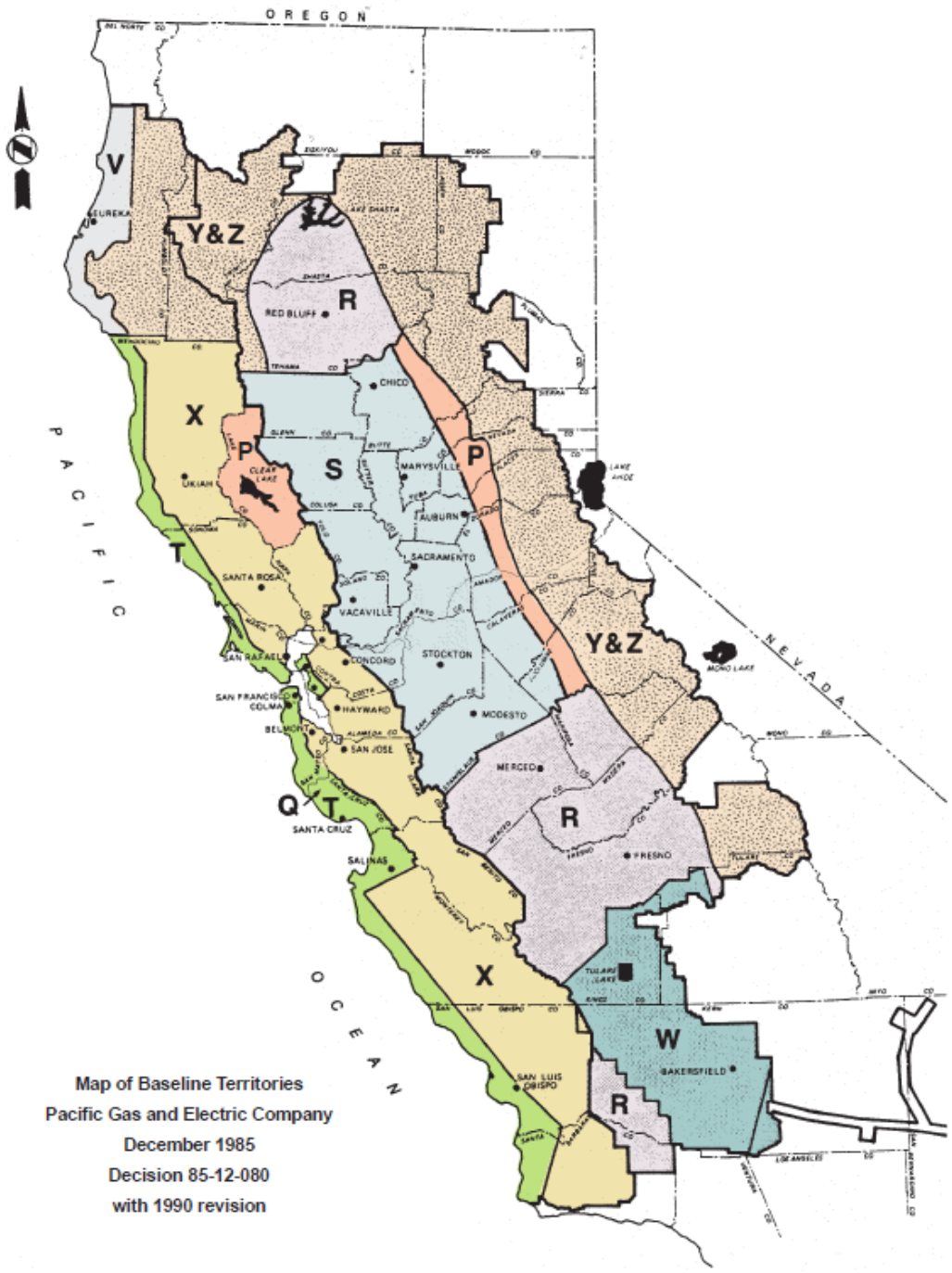
The top right of the results table section has an icon  that a user can click to download a .csv file of the Input Summary and the Results Table shown in the Output Report tab.

About DNV

DNV is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.

APPENDIX J. UTILITY BASELINE TERRITORY MAPS

PG&E Baseline Territory Map



Source: PG&E Staff

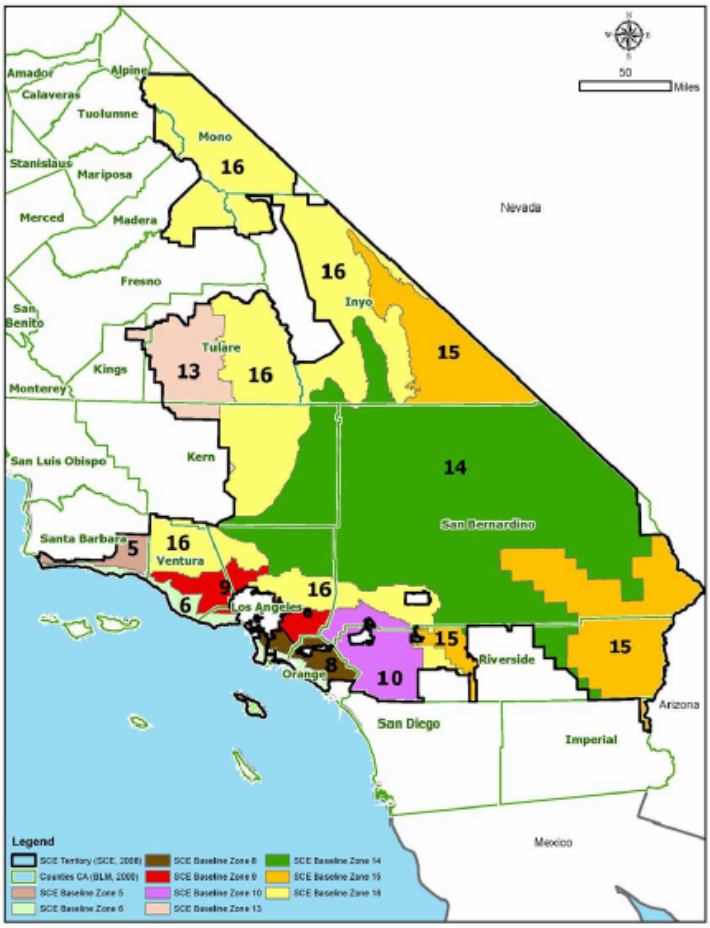
SCE Baseline Regions Map

Southern California Edison
Rosemead, California (U 338-E)

Revised Cal. PUC Sheet No. 45855-E
Cancelling Revised Cal. PUC Sheet No. 8314-E

MAP SHOWING
BASELINE REGIONS
FOR DETERMINING BASELINE QUANTITIES

Sheet 1



(To be inserted by utility)
Advice 2386-E
Decision 09-08-028
1C13

Issued by
Akbar Jazayeri
Vice President

(To be inserted by Cal. PUC)
Date Filed Sep 30, 2009
Effective Oct 1, 2009
Resolution

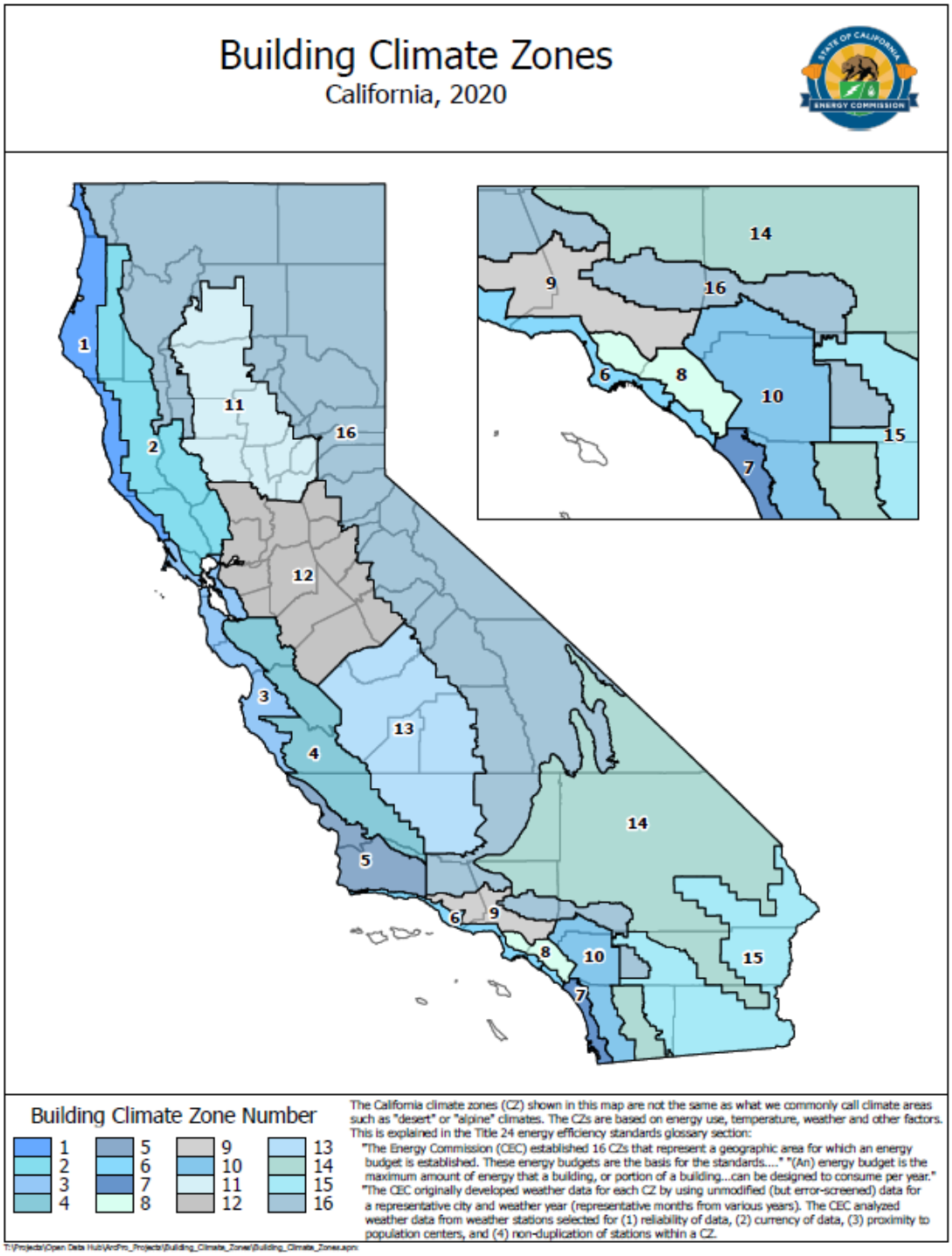
Source:
https://edisonintl.sharepoint.com/teams/Public/TM2/Shared%20Documents/Forms/AllItems.aspx?id=%2Fteams%2FPublic%2FTM2%2FShared%20Documents%2FPublic%2FRegulatory%2FTariff%2DSCE%20Tariff%20Books%2FElectric%2FBaseline%20Maps%2FELECTRIC%5FBaseline%5FMaps%5FBaseline%5FRegion%2Epdf&parent=%2Fteams%2FPublic%2FTM2%2FShared%20Documents%2FPublic%2FRegulatory%2FTariff%2DSCE%20Tariff%20Books%2FElectric%2FBaseline%20Maps&p=true&ga=1

SDG&E Baseline Regions Map

Source: https://www.sdge.com/MyRates

APPENDIX K. CEC BUILDING CLIMATE ZONES MAP

CEC Title 24 Building Climate Zones Map



Source: https://cecgis-caenergy.opendata.arcgis.com/documents/eaf3158767674e6cb14f4407186d3607/explore

About DNV

DNV is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.

PG&E Gas and Electric
Advice Submittal List
General Order 96-B, Section IV

AT&T
Albion Power Company

Alta Power Group, LLC
Anderson & Poole

Atlas ReFuel
BART

Barkovich & Yap, Inc.
Braun Blaising Smith Wynne, P.C.
California Cotton Ginners & Growers Assn
California Energy Commission

California Hub for Energy Efficiency Financing

California Alternative Energy and Advanced Transportation Financing Authority
California Public Utilities Commission
Calpine

Cameron-Daniel, P.C.
Casner, Steve
Center for Biological Diversity

Chevron Pipeline and Power
City of Palo Alto

City of San Jose
Clean Power Research
Coast Economic Consulting
Commercial Energy
Crossborder Energy
Crown Road Energy, LLC
Davis Wright Tremaine LLP
Day Carter Murphy

Dept of General Services
Don Pickett & Associates, Inc.
Douglass & Liddell
Downey Brand LLP
Dish Wireless L.L.C.

East Bay Community Energy Ellison Schneider & Harris LLP
Engineers and Scientists of California

GenOn Energy, Inc.
Green Power Institute
Hanna & Morton
ICF
iCommLaw
International Power Technology
Intertie

Intestate Gas Services, Inc.

Johnston, Kevin
Kelly Group
Ken Bohn Consulting
Keyes & Fox LLP
Leviton Manufacturing Co., Inc.

Los Angeles County Integrated Waste Management Task Force
MRW & Associates
Manatt Phelps Phillips
Marin Energy Authority
McClintock IP
McKenzie & Associates

Modesto Irrigation District
NLine Energy, Inc.
NRG Solar

OnGrid Solar
Pacific Gas and Electric Company
Peninsula Clean Energy

Pioneer Community Energy

Public Advocates Office

Redwood Coast Energy Authority
Regulatory & Cogeneration Service, Inc.

Resource Innovations

SCD Energy Solutions
San Diego Gas & Electric Company

SPURR
San Francisco Water Power and Sewer
Sempra Utilities

Sierra Telephone Company, Inc.
Southern California Edison Company
Southern California Gas Company
Spark Energy
Sun Light & Power
Sunshine Design
Stoel Rives LLP

Tecogen, Inc.
TerraVerde Renewable Partners
Tiger Natural Gas, Inc.

TransCanada
Utility Cost Management
Utility Power Solutions
Water and Energy Consulting Wellhead Electric Company
Western Manufactured Housing Communities Association (WMA)
Yep Energy